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Operations and Maintenance Plan for the OU 7-08 Organic Contamination in the Vadose Zone Project

Idaho Completion Project

Bechtel BWXT Idaho, LLC

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Idaho Completion Project
Idaho Falls, Idaho 83415

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Approved by

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ABSTRACT

A remedy for organic contamination in the vadose zone is being implemented through this operations and maintenance plan in accordance with the Operable Unit 7-08 Record of Decision. The Operable Unit 7-08 Remedial Action Project consists of (1) extracting and destroying organic contaminant vapors present in the vadose zone beneath and within the immediate vicinity of the Radioactive Waste Management Complex and (2) monitoring vadose zone vapors.

The activities and procedures for safe and compliant operation and maintenance of vapor vacuum extraction with treatment units, and the associated monitoring and extraction wells to implement the remedial action, are described in this operations and maintenance plan.

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ACRONYMS

ARAR	applicable or relevant and appropriate requirement
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
DOE	U.S. Department of Energy
DRE	destruction and removal efficiency
EDF	engineering design file
EPA	U.S. Environmental Protection Agency
FTIRS	fourier transform infrared spectrometer
HASP	health and safety plan
HSO	health and safety officer
HWD	hazardous waste determination
IDAPA	Idaho Administrative Procedures Act
IH	Industrial Hygiene
INEEL	Idaho National Engineering and Environmental Laboratory
ISCST	Industrial Source Complex Short Term
MCP	management control procedure
O&M	operations and maintenance
OCVZ	organic contamination in the vadose zone
OSHA	Occupational Safety and Health Administration
OU	operable unit
PCE	tetrachloroethene
PE	project engineer
PLC	programmable logic controller
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
ROD	record of decision

RRWAC	reusable property, recyclable materials, and waste acceptance criteria
RWMC	Radioactive Waste Management Complex
scfm	standard cubic feet per minute
SDA	Subsurface Disposal Area
TCA	1,1,1-trichloroethane
TCE	trichloroethene
VOC	volatile organic compound
VVET	vapor vacuum extraction with treatment
WGS	Waste Generator Services

Operations and Maintenance Plan for the OU 7-08 Organic Contamination in the Vadose Zone Project

1. INTRODUCTION

1.1 Purpose

The purpose of this plan is to identify the operations and maintenance (O&M) activities for the Operable Unit (OU) 7-08 vapor vacuum extraction with treatment (VVET) units, piping systems, and associated wells. Operable Unit 7-08, organic contamination in the vadose zone (OCVZ), extends from the land surface to the top of the Snake River Plain Aquifer, approximately 177 m (580 ft) beneath the Radioactive Waste Management Complex (RWMC) within the Idaho National Engineering and Environmental Laboratory (INEEL), excluding the Subsurface Disposal Area (SDA) disposal pits and trenches. The vadose zone contains volatile organic compounds (VOCs), primarily in the form of organic vapors, that have migrated from the buried waste in the SDA pits. The OCVZ remedial action is being implemented in accordance with the *Record of Decision: Declaration for Organic Contamination in the Vadose Zone Operable Unit 7-08, Idaho National Engineering Laboratory, Radioactive Waste Management Complex, Subsurface Disposal Area* (DOE-ID 1994). The primary objective of the OU 7-08 remedial action is to prevent vapor phase contaminants in the vadose zone from reaching the groundwater in concentrations that would result in future concentrations that exceed maximum contaminant levels. As stated in the OU 7-08 Record of Decision (ROD) (DOE-ID 1994), the remedy selected to reduce risks to human health and the environment associated with the organic contaminants present in the vadose zone and to prevent federal and state safe drinking water standards from being exceeded in the future, is VVET. The selected remedy consists of (1) extraction and destruction of organic contaminant vapors present in the vadose zone beneath and within the immediate vicinity of the SDA and (2) monitoring of vadose zone vapors.

1.2 Scope

The activities and procedures for safe and compliant operation and maintenance of VVET units and the associated monitoring and extraction wells to implement the remedial action are described in this O&M plan. Three catalytic oxidation systems are currently deployed at the SDA, designated as Units D, E, and F. All three electrically heated catalytic oxidizers were manufactured by King, Buck Technology located in San Diego, and are capable of processing 300–550 standard cubic feet per minute (scfm) of vapor. Unit D is currently connected to Wells 7V, SE6, IE6, and DE6. Unit F is currently connected to Wells 2E, 7E, SE3, IE3, DE3, IE4, DE4, SE8, IE8, and DE8. Unit E is currently connected to Wells 8901D, DE1, 6E, SE7, IE7, and DE7. Remote- and manually operated valves are used to select and control well-vapor flow from the any of the wells to which the valves are attached.

Regulatory guidelines and reporting requirements for safe and compliant operation of the VVET system are outlined in this plan. Operation of the VVET units complies with applicable U.S. Department of Energy (DOE) orders and federal, state, and local regulations environmental release criteria, monitoring, and reporting requirements.

2. DESCRIPTION OF VAPOR VACUUM WITH EXTRACTION OPERATIONS

To implement the selected remedy described in the OU 7-08 ROD, three catalytic oxidation systems are employed at the SDA. The VVET units extract vapor from wells located in the SDA, treat the vapor using catalytic oxidation, and vent the oxidation products through an exhaust stack into the atmosphere. The primary products of oxidation are carbon dioxide (CO_2) and hydrochloric acid (HCl).

Operational status of the VVET units includes uptime, planned downtime, and unplanned downtime. Uptime is defined as the period of operation when the VVET units are running and drawing vapor from the extraction well. Planned downtime includes periods of operation when the units are shut down for planned maintenance, planned power outages, or rebound periods. Unplanned downtime includes shutdown of a unit resulting from unplanned power outages, component failure, or operation outside of design parameters. Normal operation will consist of unmanned operation 24 hours a day, 7 days a week. An uptime operational goal will be established for each operational period by the convening agencies, project personnel, and DOE. Operational uptime will be calculated weekly and will be a percentage of uptime out of total available operational time. A review of the operational status of the units will be conducted semiannually and will be reported in the environmental and operational mid-year and end-year data reports.

A primary goal of this O&M plan is to minimize unplanned downtime during the VVET operations phase of the remedial action. This will be accomplished through implementation of a preventive maintenance and instrument calibration schedule. This schedule will serve to detect component deficiencies early and to minimize the failures that result in unplanned shutdown.

A project team has been assembled to draw on the expertise of each engineering discipline (i.e., electrical, mechanical, and chemical). A team of qualified technicians is permanently stationed at the RWMC to start up and shut down the oxidizers, facilitate preventive maintenance activities, and monitor operations. A system engineer is assigned to the OCVZ Project to monitor specific trends of the units (e.g., operating temperature and pressure and system flow rate) and troubleshoot, identify, and locate problems before they cause ultimate failure. Components of this program ensure that operating time for the units is maximized. The semiannual data report provides a forum for discussion of lessons learned during the preceding months of operation. Review and discussion of the lessons learned satisfies required proficiency training to maintain operating technician qualifications.

As stated, planned downtime includes rebound periods conducted at selected sample locations to maximize VOC mass removal. The number and length of the short-term rebound periods will be determined by the project as the VVET operations database is established. The intent of the rebound period is to allow subsurface concentrations to equilibrate so that the progress of the remedial effort can be assessed. If vapor emissions and trends across the short-term rebound periods meet specified statistical criteria, the project will enter into a long-term rebound period referred to as the quiescent compliance verification period (INEEL 2000) to verify that vapor emissions remain within acceptable limits under natural pressure conditions within the vadose zone. If vapor emissions and trends during the compliance verification period meet specified statistical criteria, the project will enter into the long-term monitoring phase. During the long-term monitoring phase, sampling frequencies will be reduced and the VVET units will be taken out of service, based on the understanding that restart of the VVET units is not imminent.

The *Health and Safety Plan for Vapor Vacuum Extraction with Treatment for Operable Unit 7-08, Organic Contamination in the Vadose Zone* (Miller and Wooley 2003) establishes the procedures and requirements that are used to eliminate or minimize health and safety risks to personnel working at the

VVET units and associated monitoring of the vadose zone. The OCVZ Health and Safety Plan (HASP) (Miller and Wooley 2003) specifically contains information about the hazards involved in performing the work as well as actions and equipment that will be used to protect workers while conducting project tasks.

2.1 System and Equipment Description

The treatment process can be divided into the following three basic operations: (1) pretreatment, (2) catalytic oxidation, and (3) stack release of the oxidizer exhaust gas. Functions of each operation are discussed in the sections below. Piping and instrumentation diagrams of the VVET Units D, E, and F catalytic oxidizer are included in Appendix A. Additional Unit D, E, and F system documentation can be located in the Unit D, E, and F system design description documents (SDD-174, SDD-175). Detailed component-level information, including system design criteria, is recorded in the INEEL Configuration Management System Component Equipment List.

2.1.1 Pretreatment

The pretreatment equipment collects extracted VOC vapor into a header using a vacuum blower. The VOC vapor is withdrawn from the wellheads and carried to the oxidizers through insulated piping. Supplemental heat is provided to the flowing vapor to minimize condensation of vapor in the transfer lines by heaters in the well line. Each manifold is configured to accept feed from multiple well locations. The fraction of feed withdrawn from any given well is controlled through the adjustment of hand control valves or automatic flow-control valves on the respective well lines. Each well line is equipped with a drain at the lowest point to remove any accumulated liquids in the well line. Vapor flow rate is measured from each extraction well upstream of the manifold connection. Total vapor pressure, temperature, and flow are monitored and controlled in the main vapor header upstream of the oxidizer.

2.1.2 Oxidation

Catalytic oxidation is used in contaminant destruction in VVET Units D, E, and F. Vapor flow entering the catalytic oxidizer is directed through a vapor liquid separator to remove any free-phase liquids that may be entrained in the vapor flow. The flow is then directed into the heat exchanger where heat is recovered from exhaust gases into the inlet flow. Exiting the heat exchanger, the inlet flow is conducted past an electric bayonet-style heater where the temperature is elevated to the set point temperature of the catalytic process, nominally 950°F. At this temperature, halogenated compounds are destroyed in a catalytic reaction. Before exiting, the vapor passes through a heat exchanger to recover heat from the outlet stream.

2.1.3 Exhaust

Oxidation products are exhausted from the system through a 9.1-m (30-ft) stack. The carbon tetrachloride (CCl_4) destruction and removal efficiencies (DREs) for the catalytic oxidation systems are calculated to be 99.99% (Soelberg et al. 2001). While composed primarily of excess air, water, and oxidation products, trace quantities of unreacted VOCs (e.g., CCl_4, trichloroethene [TCE], tetrachloroethene [PCE], and 1,1,1-trichloroethane [TCA]) are expelled from the stack with the product gases. The primary oxidation products are HCl and CO_2, with a lesser quantity of chlorine gas (Cl_2). The presence of excess water works to minimize the production of Cl_2. The stack temperature for the catalytic system is approximately 350–500°F.

2.2 Catalytic Oxidizer Startup Sequence

Catalytic oxidation system startup begins with an inspection to verify valve positions and resolve any conditions that may have resulted in a prior shutdown. After inspection, the blower is started, feeding ambient air into the oxidation system. The system heater is enabled and temperature is raised to the startup temperature of 850°F. With the catalyst at the startup temperature, the extraction well valve is opened and vapor oxidation commences. Figure 1 illustrates the major equipment associated with the catalytic oxidation system. Table 1 shows catalytic oxidizer specifications.

2.3 Emergency Shutdown

Each of the oxidation systems is equipped with a programmable logic controller (PLC), which will automatically shut the unit off in the event of an unexpected or potentially unsafe condition. Alarm conditions are indicated on the supervisory control and data acquisition screens, operator interface terminal (Unit D OIT), and touch screen interface (Unit E/F).

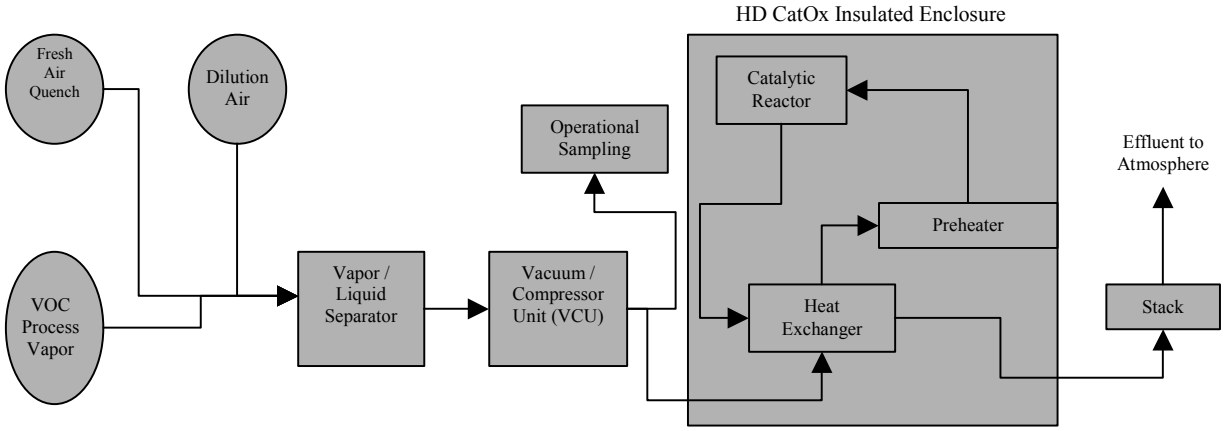

Figure 1. Block diagram of catalytic oxidation system.

Table 1. Catalytic oxidizer specifications.

Specifications[a]	Unit D	Units E and F
Nominal capacity	500 scfm	500 scfm
Daily destruction rate of Cl-VOC[b]	415.2 lb/day (maximum)	415.2 lb/day (maximum)
Equivalent concentration	1,500 ppmv mixed Cl-VOC	1,500 ppmv mixed Cl-VOC
Dimensions	10-ft 10-in. long × 8-ft 6-in. wide	30-ft long × 10-ft wide
Weight	6,100 lb (approximate)	24,000 lb (approximate)[c]
Electric requirements:		
Vacuum compressor unit motor	25 hp, 460 V, 3Ø	75 hp, 460 V, 3Ø
Preheater	62 kW, 460 V, 3Ø	70 kW, 460 V, 3Ø
Heat exchanger efficiency	60% thermally efficient	60% thermally efficient

a. As provided by King, Buck Technology.
b. Calculated by King, Buck from procurement specification of DRE based on operating temperature and gas flow rate.
c. Eight of Units E and F include the weight of the cargo container because the system is built into the enclosure.
DRE = destruction and removal efficiency
VOC = volatile organic compound

2.4 Freeze Protection

Freeze protection is afforded to each of the oxidizers by using steel enclosures. Temperature-sensitive components are housed within the heated structures to minimize exposure to cold temperatures. In a similar manner, electronics, including the PLCs, are housed within climate-controlled enclosures. Flex lines are installed on each pipe run to minimize the stress caused by frost heave. Multiple heaters have been placed in long stretches of well line to prevent ice damming.

2.5 Operations Waste

Generation of waste materials requiring hazardous material handling and disposal is not anticipated. A waste disposition and disposal form has been developed through Waste Generator Services (WGS) to handle any liquid hazardous waste (e.g., vapor condensate) that may accumulate during system operation. Other waste streams, including various system filters, belts, and oils, are dispositioned and disposed of through WGS as necessary. All materials are surveyed by radiological control technicians (before removal from the SDA) to verify that no radioactive contamination is present.

2.5.1 Waste Management

The waste streams that result from OCVZ operations are appropriately managed as Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) (42 USC § 9601 et seq., 1980) waste generated in support of implementing the OU 7-08 ROD. This section describes the waste streams to be generated and the considerations associated with generation, storage, and disposition of the waste streams including waste minimization considerations. As indicated below, the nature of the VVET operations results in only limited waste generation primarily consisting of solid industrial waste.

All waste streams generated from OCVZ operations will be managed under the direction of OCVZ Project personnel in close coordination with the WGS organization in accordance with the applicable or relevant and appropriate requirements (ARARs) documented in the OU 7-08 ROD and the requirements and processes defined in the applicable INEEL management control procedures (MCPs). In particular, INEEL Companywide *Manual 17 - Waste Management* will be followed in addition to other applicable internal documents such as the *INEEL Reusable Property, Recyclable Materials and Waste Acceptance Criteria (RRWAC)* (DOE-ID 2004). As required by the ROD and internal procedures, completion of a hazardous waste determination (HWD) is key to the initial management of all waste streams.

2.5.2 Waste Characterization and Management

Operation and maintenance of the various OCVZ systems results in the generation of a limited number of waste streams. The primary materials generated are solid waste items classified as industrial or conditional industrial waste under the RRWAC. Examples of these waste streams include tedlar bags and air filters.

It is noted that the SDA itself does contain waste streams that may potentially be associated with Resource Conservation and Recovery Act (RCRA) (42 USC § 6901 et seq., 1976) listed hazardous waste numbers; however, the uncontained gases (i.e., vadose zone vapors) processed by the VVET units are not solid waste by definition and, therefore, are not associated with listed waste codes.

In the event that equipment leaks or chemical spills occur, the spilled materials (along with visibly contaminated soil) will be containerized, subjected to a complete HWD, and dispositioned as waste in accordance with INEEL procedures. Generally, routine spills will be cleaned up at the time they occur, but no longer than 24 hours after the spill, as allowed by normal operational conditions (i.e., absent

emergency conditions). All spills, regardless of amount, require notification of the spill notification team in accordance with applicable MCPs.

The waste resulting from these operations may require interim storage before transfer for disposal. Because there is a small potential that some waste streams will be associated with RCRA management considerations, the waste may be stored in containers pending return of analytical data and completion of the HWD. A waste storage area for managing CERCLA waste has been established by WGS personnel to ensure appropriate management of residual materials pending completion of the HWD and shipment for disposal.

Packaging will be in compliance with the RRWAC, RCRA regulations found in 40 CFR 264 Subpart I, and U.S. Department of Transportation regulations (49 CFR 171, 173, 177, and 178). The assigned WGS personnel, along with Packaging and Transportation organizations, should be consulted before waste generation to identify specific container types to be used for the anticipated waste. Appropriate containers for waste include 208-L (55-gal) drums and other suitable containers that meet the Department of Transportation regulations on packaging (49 CFR 171, 173, 178, and 179). All waste containers will be labeled appropriately.

Records and reports related to waste management are required to be maintained as indicated by MCP-3475, "Temporary Storage of CERCLA-Generated Waste at the INEEL." Some of these may be completed by others, but must be available either at the RWMC or with the OCVZ or Waste Area Group 7 project files located in the Technical Support Building in Idaho Falls. These records shall include, but not be limited to, the following:

- Hazardous waste determinations, characterization information and statements of process knowledge
- CERCLA Storage Area inspection reports and log-in and log-out history
- Training records
- Documentation with respect to all spills.

2.5.3 Waste Segregation

Construction waste streams will generally not be hazardous waste, but rather will be industrial waste and will not typically require RCRA or Toxic Substances Control Act compliant storage (15 USC § 2601 et seq., 1976). Some industrial waste generated during construction (e.g., office waste and lunch trash) can be disposed of in cold waste receptacles.

Container storage areas and containers for collection of waste will be labeled clearly to identify waste type. Waste will generally be segregated according to waste category (e.g., hazardous classification) and type (i.e., solid, liquid, soil, and sludge). This segregation entails separation of mixed waste, low-level waste, and hazardous, solid, and liquid waste streams within containers and within the storage facility. Waste segregation may be an iterative process such that initial classifications of waste may change after receipt of analytical results. Finally, segregation of waste materials to address issues related to incompatible chemicals or properties (e.g., flammability) will also occur.

2.5.4 Waste Minimization and Pollution Prevention

The OU 7-08 O&M activities are conducted in accordance with the *U.S. Department of Energy, Idaho Operations Office Idaho National Engineering and Environmental Laboratory Pollution Prevention Plan* (DOE-ID 2000). The plan specifies pollution prevention and waste minimization program activities and methods that will be employed to reduce the quantity and toxicity of waste generated at the INEEL. Various general pollution prevention program information relating to waste minimization (e.g., waste tracking and employee incentive programs) can be referenced in the plan.

The following project-specific activities will ensure that minimal quantities of waste are generated, or that hazardous waste generation is avoided:

- Personal protective equipment (PPE) use will be minimized by reusing and laundering items to the extent possible
- Controls on disposal and materials accepted for use will be implemented (as appropriate) to ensure minimal waste generation
- Equipment maintenance is required to prevent undesirable conditions (e.g., leaking hoses and fittings)
- Industrial waste disposition will be minimized by discussing conservation measures with operational staff during daily briefings
- Any potential hazardous waste will be systematically segregated from industrial or sanitary waste streams
- All samples necessary will be collected at one time so that additional waste is not generated from resampling.

The INEEL project managers assigned to each remediation project have specific responsibility for implementing waste minimization requirements for that project. The waste minimization and pollution prevention requirements, as implemented in MCPs, are required reading for all project managers. Project personnel are required to read and understand the pertinent portions of project plans relating to waste minimization and pollution prevention (e.g., health and safety plans and test plans), with respect to their functions, before performing the tasks.

With certification of the Integrated Safety Management System, pollution prevention becomes an integral part of planning, operations, and work activities at all INEEL facilities. Pollution prevention goals and training programs have been implemented into Integrated Safety Management System documentation, including various INEEL program description and requirements documents and MCPs.

3. DOCUMENTATION

Procedures and operator logbooks have been developed to direct and record operating data and events. Operating data include startup, shutdown, normal operation, troubleshooting, and operability testing. The following section identifies and describes various procedures applicable to operation and testing of the oxidation systems. Appendix B provides copies of the log sheets and Technical Procedures (TPRs) –1662, "VVET Catalytic Oxidizer Startup, Operations, and Shutdown," and –1634, "VVET Units E and F Catalytic Oxidizer Startup, Operation, and Shutdown"

Drawings are updated and maintained in accordance with MCP-2377, "Development, Assessment, and Maintenance of Drawings." The drawings are available within the INEEL Electronic Data Management System. System drawings, including piping and instrumentation diagrams, are included in Appendix A.

3.1 Prejob Briefings

Prejob briefings are conducted in accordance with MCP-3003, "Performing Pre-Job Briefings and Post-Job Reviews," and documented on Form 434.14, "Pre-Job Briefing Checklist." Individual prejob briefings are conducted and documented before maintenance activities, system repairs, modifications, and execution of new or revised procedures. Executed prejob briefing forms are maintained as work control documentation with the associated Standard (STD) –101, "Integrated Work Control Process," work package or project file.

3.2 Material Safety Data Sheets

Material safety data sheets for any chemicals used on the project can be accessed through the INEEL intranet. A list of chemicals used or stored at the job site is available through the INEEL Chemical Management System.

3.3 Catalytic Oxidizers

3.3.1 Vapor Vacuum Extraction with Treatment Catalytic Oxidizer Startup, Operations, and Shutdown

Procedures in TPRs-1662 and -1634 provide specific instructions for startup, operation, and shutdown of the catalytic units; direct the pre-startup inspection; and specify flow, pressure, and temperature parameters appropriate for system operation. Operational activities are performed by a qualified VVET technician.

3.3.2 Vapor Vacuum Extraction with Treatment Unit Operational Sampling

Procedures in TPRs -1662 and -1634 direct the routine operational sampling of the influent vapor and air mixture from the inlet to the VVET catalytic oxidizers. These procedures cover daily collection of samples, transportation of the samples to the Central Facilities Area laboratory, and notation of sampling actions in the VVET unit narrative log. Samples are collected daily (i.e., Monday through Thursday) and analyzed using a Bruel & Kjar multigas photoacoustic analyzer.

3.3.3 System Operability Testing

Preshipment component checkout and system operability testing was performed at the manufacturer's shop to ensure that individual components of each oxidizer functioned as designed and according to the project technical specification before shipment to the INEEL. Testing was witnessed and approved by INEEL representatives. Test reports were submitted to INEEL, and were reviewed and approved as part of the catalytic oxidizer procurement subcontract vendor data submittals provided by King, Buck Technology.

Additional component checkout and operability testing was completed at the INEEL after delivery and installation of the catalytic oxidizers and associated piping systems. This testing demonstrated that oxidizers were not damaged during shipping, and that field instruments and components, including the transformer, heaters, valves, and thermocouples, were properly installed. Proper function of the Supervisory Control and Data Acquisition system was also verified during onsite system operability testing. Component checkout and system operability test reports were submitted to INEEL, and were reviewed and approved as part of the catalytic oxidizer installation subcontract vendor data submittals provided by L&L Mechanical and Wheeler Electric subcontractors. Following onsite system operability testing and final turnover from construction to operations, each of the catalytic oxidation systems entered a 6-week period of shake-down operations before full-scale operation began.

3.3.4 Vapor Vacuum Extraction with Treatment Unit D Performance Testing

A catalytic oxidizer performance test (i.e., acceptance test) was conducted for the VVET Unit D catalytic oxidizer according to the test plan (Soelberg 2000). The test provided data for the following emissions modeling test objectives:

- Determine the CCl_4 destruction and removal efficiency
- Determine emissions of HCl and Cl_2 resulting from operation of Unit D
- Determine any measurable amounts of VOC products of incomplete destruction.

The performance test results demonstrated that CCl_4 destruction and removal efficiency ranged between 99.997 and 99.999%. The results were calculated from the gravimetric flow rate of feed CCl_4, and CCl_4 emissions measured by the U.S. Environmental Protection Agency (EPA) Method 0031 (Soelberg 2000).

Because VVET Units E and F were of similar construction to Unit D, performance testing was not required as part of final acceptance.

3.3.5 Logbooks

The VVET operations logbooks are used to record system operating data for flow, temperature, and pressure, and to guide the technician in completion of routine surveillance tasks to monitor equipment conditions. As the logbooks are completed, the technician ensures that all systems are functioning properly. Circumstances and reasons for any operational downtime, as well as their duration, are recorded in the logbooks. Operations logbooks are kept either at the VVET units or in the site project office. Completed logbooks are retained in document control and are scanned into the Optical Imaging System, providing access to archived operations data. Logbook sheets are included in Appendix B.

4. SYSTEM MAINTENANCE

Maintenance instructions and procedures, along with a thorough check of all operating conditions, have been developed and implemented to ensure the proper operation of the catalytic oxidizers. A scheduled maintenance program has been developed to minimize operational problems (e.g., equipment failure). Various maintenance activities, including instrument calibration, are completed at various monthly, quarterly, semiannual, and annual intervals, as recommended by manufacturer specifications.

4.1 Preventive Maintenance

Preventive maintenance activities are completed to maximize operational uptime of the oxidation systems. Maintenance activities are detailed in Table 2 with their respective intervals.

Details of past system failures and measures taken to correct them are collected and reported at 6-month intervals as part of the OCVZ semiannual data report. This information is collected in the system optimization and maintenance section of the data report. Information in this section of the report includes the details of any process enhancements, system repairs, changes to the preventive maintenance procedures, and any planned future modifications intended to increase process performance. This information is used to identify required changes to the preventive maintenance schedule to ensure continued operational reliability.

4.2 Calibration

Instrument calibrations are completed at regular intervals to maximize the quality of operations data and the confidence with which these data can be applied to make judgments relative to process performance. Calibration of only the primary flow element in each system is required. The flow elements are calibrated according to the intervals in Table 3. The primary flow elements will undergo an annual performance check that will use a calibrated hotwire anemometer for in situ flow verification. Concurrence of the INEEL calibration lab with the OCVZ calibration approach is documented in correspondence included in Appendix C. Calibration of other process indicators, including wellhead flowmeters, temperature elements, and pressure transmitters, is not required.

Table 2. Preventive maintenance activities for catalytic oxidizers.

VET Unit[a]	Equipment Tag	Description	Activity	Interval
VVED VVEE VVEF	BLO-101	Blower	Grease blower bearings as necessary, check for unusual vibration.	Monthly
VVED VVEE VVEF	BLO-101	Blower	Drain, flush, and replace gearbox oil. Use only straight mineral oil (aviation oil).	Quarterly
VVED VVEE VVEF	BLO-101	Blower	Check tightness of pulley; inspect drive belts.	Quarterly
VVED VVEE VVEF	FLT-102	Ambient air intake filter	Inspect and brush off collected dust and debris or replace as necessary.	Quarterly

Table 2. (continued).

VET Unit[a]	Equipment Tag	Description	Activity	Interval
VVED VVEE VVEF	FLT-101	Demister pad	Inspect and brush off collected dust and debris or replace as necessary.	Semiannual
VVED	AC-605	Air conditioning filter	Inspect and brush off collected dust and debris or replace as necessary.	Monthly
VVED VVEE	MO-101	Blower motor	Grease motor bearings as necessary.	Annual
VVEE VVEF	UIT-101	Pressure transmitter	Complete performance check.	Annual
VVED		Immersion heaters	Check tightness and clean line connections as necessary.	Annual
VVEE	HTR-140, -150, -160, -201	Immersion heaters	Check tightness and clean line connections as necessary.	Annual
VVEF	HTR-140, -150, -160, -170, -172, -201	Immersion heaters	Check tightness and clean line connections as necessary.	Annual
VVED VVEE VVEF	VLS-101	Vapor liquid separator	Remove and clean view ports.	Annual
VVED VVEE VVEF	HE-300	Heat exchanger	Open ports. Inspect for moisture buildup.	Annual

a. VVED, VVEE, and VVEF are designators for VVET Units D, E, and F, respectively, in accordance with the INEEL configuration management database.

Table 3. Calibration intervals for pressure and temperature instruments.

Instrument Tag Number	Instrument Description	Manufacturer	Instrument Calibration Range	Recommended Calibration Interval
VVED-PDT-101	Differential pressure transmitter	Rosemount	0–10 in. H_2O	Annual
VVED-FE-101	Differential pressure process flow sensor	Dwyer Instruments	0–500 scfm	Annual
VVEE-UIT-101	Multivariable transmitter	Rosemount	0–500 scfm	Annual
VVEF-UIT-101	Multivariable transmitter	Rosemount	0–500 scfm	Annual

4.3 Spare Parts

Spare parts are ordered and maintained in storage at the RWMC. Table 4 lists spare parts for the catalytic oxidizer. The master equipment list, including part descriptions, is available as a vendor data submittal from King, Buck as a separate document.

Table 4. Recommended spare parts.

VVET Unit[a]	Item No.	Manufacturer	Part No.	Description
VVED	FLT-101	Solberg	235P	Filter replacement (McMaster-Carr)
VVED	FLT-102	ACS	5CA	10 in. O.D. × 6 in. 304LSS demister pad
VVED	BLO-101	Gates/Grainger	BX90	Belts for blower
VVEE	FLT-101	Solberg	235P	Filter replacement (McMaster-Carr)
VVEE	FLT-102	ACS	5CA	10 in. O.D. × 6 in. 304LSS demister pad
VVEE	BLO-101	Gates/Grainger	BX90	Belts for blower
VVEF	FLT-101	Solberg	235P	Filter Replacement (McMaster-Carr)
VVEF	FLT-102	ACS	5CA	10 in. O.D. × 6 in. 304LSS demister pad
VVEF	BLO-101	Gates/Grainger	BX90	Belts for blower
VVED, E, and F	VLS	Grainger	1U928	View port
VVED, E, and F	QC101	Swagelok	SS-QC4-B-4PM	Quick-disconnect sample ports

a. VVED, VVEE, and VVEF are designators for VVET Units D, E, and F, respectively, in accordance with the INEEL configuration management database.

5. VAPOR VACUUM EXTRACTION WITH TREATMENT AIR EMISSIONS MONITORING

The VOCs expected in the influent vapor stream for each type of unit are chloroform ($CHCl_3$), TCE, TCA, PCE, and CCl_4. Air dispersion modeling has been performed to estimate the expected discharge of each compound and to determine the resulting health effects to collocated workers and persons at the nearest receptor site. Air dispersion modeling is discussed in the following section.

Two sampling methods were used to monitor worker exposure to hazardous chemicals. Included in these were open path fourier transform infrared spectrometer (FTIRS) and active sampling area monitoring. Occupational monitoring was conducted at various locations in the SDA, as described in the sections below.

Influent and effluent vapor sampling and analysis is also performed to measure performance of the catalyst at Units D, E, and F. Performance testing is completed using FTIRS. Performance monitoring is discussed below.

5.1 Air Emissions Regulations

As a CERCLA project, the detailed regulatory framework under which the remedial action is taken is defined by the ARARs set in the ROD. These represent the substantive requirements that are to be met by the OCVZ Remedial Action Project. The ARARs and other requirements to be considered, as set by the ROD for the OCVZ remedial action, are presented in Table 5.

Table 5. Applicable or relevant and appropriate requirements and to-be-considered criteria for the organic contamination in the vadose zone remedial action.

Statute	Regulation	Relationship
RCRA	IDAPA § 58.01.05.500.05, (40 CFR 261.10, 261.20–261.24) "Idaho Rules, Regulations and Standards for Hazardous Waste."	Relevant and appropriate
	40 CFR 264.600 Subpart X, "Miscellaneous Units."	Relevant and appropriate
Clean Air Act	40 CFR 61.92, "National Emission Standards for Radionuclide Emission from DOE Facilities."	Applicable
	IDAPA § 58.01.01.577, "Ambient Air Quality Standards for Specific Air Pollutants."	Applicable
Idaho Toxic Air Pollutants Non-Carcinogenic Increments	IDAPA § 58.01.01.585, "Idaho Toxic Air Pollutants Non-Carcinogenic Increments."	Applicable
Idaho Toxic Air Pollutants Carcinogenic Increments	IDAPA § 58.01.01.586, "Idaho Toxic Air Pollutants Carcinogenic Increments."	Applicable
Idaho Rules for Control of Fugitive Dust	IDAPA § 58.01.01.651, "Idaho Rules for Control of Fugitive Dust."	Applicable
Idaho Demonstration of Preconstruction Compliance with Toxic Standards	IDAPA § 58.01.01.210.10, "Idaho Demonstration of Preconstruction Compliance with Toxic Standards."	Relevant and appropriate
DOE order	DOE Order 5820.2A, "Radioactive Waste Management."	To be considered material

DOE = U.S. Department of Energy
RCRA = Resource Conservation and Resource Act

5.2 Air Dispersion Modeling

Engineering Design File (EDF) –1901, "Operable Unit 7-08 Air Dispersion Modeling and Health Effects from Thermal and Catalytic Oxidation Unit Emissions at the Radioactive Waste Management Complex," provides information on dispersion of seven nonradioactive contaminants (i.e., $CHCl_3$, TCE, TCA, PCE, CCl_4, HCl, and Cl_2) generated from two thermal oxidation units (i.e., VVET Units A and B) and one catalytic oxidation unit (i.e., Unit D) at the RWMC using the Industrial Source Complex Short Term 3 (ISCST3) model (EPA 1995). The ISCST3 air model (EPA 1995) was used to evaluate the maximum 1-hour, 8-hour, and 24-hour concentrations at the RWMC in a 50-m grid of receptor sites, as well as the maximum annual concentrations at offsite public access locations, US Highway 20/26, the Experimental Breed Reactor-1 access road and visitor center. Results are compared with occupational exposure values promulgated by the American Conference of Government Industrial Hygienists (ACGIH 2000), the Occupational Safety and Health Administration (OSHA), and the National Institute for Occupational Safety and Health (NIOSH) with State of Idaho ambient air standards (IDAPA 58.01.01.577, Section 006), and with EPA health protective limits. Modeling results indicate that estimated air concentrations will not exceed regulatory limits and standards on and off the RWMC.

The oxidizer units have been installed to minimize the additive effects at any receptor location. To achieve this, care was taken to ensure that no two units were placed directly in line in the prevailing wind direction. This minimized the likelihood of exceeding any OSHA, State of Idaho, or EPA air quality limits. Dispersion modeling completed and documented in EDF-1901 indicates that the emissions from oxidizers Units A, B, and D were unlikely to exceed any regulatory limits.

The oxidizer units have been installed to minimize the additive effect at any receptor location. To achieve this, care was taken to ensure that no two units were placed directly in line in the prevailing wind direction. This minimized the likelihood of exceeding any OSHA, State of Idaho, or EPA air quality limits or the maximum ground level concentrations regulatory limits. Dispersion modeling completed and documented in EDF-1901 indicated that the emissions from oxidizers VVET Units D, E, and F were unlikely to result in exceeding any regulatory limits.

5.3 Occupational Monitoring

Two methods were used to monitor worker exposure to hazardous chemicals. Included in these were open path FTIRS and active sampling area monitoring. Monitoring was conducted at various locations in the SDA as described in the following sections.

5.3.1 Open Path Fourier Transform Infrared Spectrometry

Air monitoring using open path FTIRS was completed during 1999, 2000, and 2001 to determine the impact on air quality from operating the three VVET units located in the SDA. Two open path FTIRSs were deployed during the 1999, 2000, and 2001 field seasons at three locations in the prevailing downwind direction of the VVET units. The two open path units were rotated through the three sampling locations at prescribed intervals as shown in Table 6. It is important to note that the open path FTIRSs were calibrated by the manufacturer, but outside of an ANSI Z540-1, "American National Standard for Calibration—Calibration Laboratories and Measuring and Test Equipment General Requirements," certified calibration program. Monitoring results and analysis of data collected using the open path FTIRS are reported in the *Air Monitoring Results of the Subsurface Disposal Area at the Radioactive Waste Management Complex for Operable Unit 7-08 Organic Contamination in the Vadose Zone 2001 Supplement* (Harvego 2002). Additional monitoring is planned to support future project and regulatory decisions involving emissions.

Table 6. Open path fourier transform infrared spectrometry deployment schedule.

Open Path Fourier Transform Infrared Unit	Dates	Monitoring Location	Path Length
Unit 1	6/21/00 to 7/27/00	Unit C	195 m
Unit 2	5/10/00 to 8/21/00	Unit A	210 m
Unit 2	8/21/00 to 10/31/00	Unit B	180 m
Unit 1	8/21/01 to 9/29/01	Unit A	190 m
Unit 1	9/29/01 to 11/1/01	Unit B	180 m
Unit 2	8/21/01 to 11/1/01	Unit D (replaced Unit C in 2001)	200 m

This air monitoring results report provides the measured concentrations of 10 target off-gas compounds, eight VOCs, and two volatile inorganic compounds (i.e., HCL andCO_2). Target compounds are listed below:

- 1,1,1-Trichloroethane
- Carbon monoxide
- Carbon tetrachloride
- Chloroform
- Freon 113
- Hydrochloric acid
- Methane
- Methylene chloride
- Propane
- Trichloroethene.

This air monitoring results report also provides a summary of monitoring activities completed during the 2000 and 2001 field seasons including deployment schedule, generalized monitoring procedures, and data analysis. The report also provides interpretation of trends in the data, draws conclusions, and makes recommendations for future air monitoring.

A comparison of detected instantaneous compound concentrations to Industrial Hygiene (IH) exposure limits showed that in all cases, contaminant concentrations were well below any 8-hour time-weighted average exposure limit. The observed maximum target compound concentrations and the associated exposure limits are detailed in Table 7.

Table 7. Maximum detected target compound concentrations and exposure limits.

Target Compound	8-Hour Exposure Limit	Maximum Instantaneous Concentration[a]
1,1,1-Trichloroethane	350 ppmv[b,c]	0.29 ppmv
Carbon monoxide	25 ppmv[b]	0.33 ppmv
Carbon tetrachloride	5 ppmv[b]	0.13 ppmv
Chloroform	10 ppmv[b]	0.24 ppmv
Freon 113	1,000 ppmv[b,c]	0.16 ppmv
Hydrogen chloride	5 ppmv[d]	0.10 ppmv
Methane	N/A[e]	0.44 ppmv
Methylene chloride	25 ppmv[c]	0.59 ppmv
Propane	1,000 ppmv[c]	0.10 ppmv
Trichloroethene	50 ppmv[b]	0.20 ppmv

a. Data were collected with instruments not calibrated under a program conforming to ANSI Z540-1. These data should be considered survey quality and preliminary in nature.
b. The value shown was obtained from ACGIH (2001).
c. The value shown was obtained from the Occupational Safety and Health Standards for General Industry (29 CFR 1910).
d. The value shown represents the ceiling limit for this compound.
e. N/A = not applicable.

5.3.2 Industrial Hygiene Sampling

Industrial Hygiene sampling took place in the OCVZ VVET Unit A and B enclosures on August 28, 2001, and August 29, 2001, respectively. The Unit D enclosure was not sampled because it was out of service at the time. All samples were taken using active sampling pumps and covered a full-day sample period. Airborne contaminants sampled using National Institute for Occupational Safety and Health (NIOSH) analysis methods included chlorine gas (NIOSH Method 6011), HCl (NIOSH Method 7903), TCE (NIOSH Method 1003), $CHCl_3$ (NIOSH Method 1003), and CCl_4 (NIOSH Method 1003). The doors on the Unit A enclosure were both closed during the initial part of the sampling in an effort to create a worst-case scenario environment. By noon, the temperature had risen considerably inside the unit enclosure, and one door was propped open. Samples in the Unit B enclosure were taken with one door open and one door closed for the entire sample period. Schneider Laboratories performed the analyses. The normal operating configuration for each of the enclosures is with the skirting on and the personnel access doors closed; however, personnel access doors are often left open during the summer months to allow air to circulate through and cool the enclosures. From an IH standpoint, the enclosures with closed doors present a worst-case scenario.

Industrial Hygiene area sampling was conducted in the OCVZ VVET Unit A and D enclosures on February 11, 2002. Airborne contaminants sampled again included chlorine gas, HCl, TCE, $CHCl_3$, and CCl_4. As before, sampling was performed using NIOSH analytical method numbers 6011 and 7903, for chlorine gas and HCl, respectively. The organic samples were taken using SKC 575-series passive samplers for organic vapors. Chlorine gas and HCl were sampled over 385 minutes. The organic series was sampled over 23 hours (1,380 minutes). The doors were closed on both enclosures during the entire sampling period. Table 8 provides the sampling results.

Table 8. Industrial hygiene sampling results.

Analyte	Actual Exposure (ppmv)	Report Limit (ppmv)
Unit A August 28, 2001		
Chlorine	<0.004	0.005
Hydrochloric acid	<0.008	0.005
Tetrachloroethene	<0.015	0.041
Chloroform	<0.020	0.040
Carbon tetrachloride	0.050	0.040
Unit B August 29, 2001		
Chlorine	<0.004	0.005
Hydrochloric acid	<0.009	0.005
Tetrachloroethene	<0.014	0.041
Chloroform	<0.019	0.040
Carbon tetrachloride	<0.015	0.040
Unit D February 11, 2002		
Chlorine	<0.005	0.5, C1[a]
Hydrochloric acid	<0.05	C5
Trichloroethene	<0.50	50
Chloroform	<0.58	10
Methylene chloride	<0.85	25
Carbon tetrachloride	<0.45	5
Unit A February 11, 2002		
Chlorine	<0.005	0.5, C1 [a]
Hydrochloric acid	<0.05	C5 [a]
Trichloroethene	<0.50	50
Chloroform	0.91	10
Methylene chloride	<0.85	25
Carbon tetrachloride	3.20	5

a. Most conservative limit is listed. Ceiling values are denoted by "C".

Two analytes (i.e., $CHCl_3$ and CCl_4) were found above the respective limits of detection, both in the Unit A enclosure sample. The $CHCl_3$ detection was very low and does not pose a health concern to the OCVZ VVET employees. The CCl_4 results showed a 23-hourr average of 3.20 ppmv in the second set of samples. Because this is a full 23-hour average air sample, it is not indicative of actual employee exposure.

In initial industrial hygiene sampling (August 28, 2001), the highest CCl4 concentration was 0.05 ppmv, 1/64 the concentration of the latest sample, 3.2 ppmv (February 11, 2002). The initial sample was collected with one Unit A door propped open and with no skirting installed. The latest sample was collected with the doors closed and the skirting installed. This may explain the variation in sample results.

Future IH sampling and monitoring will focus on the CCl_4 concentrations inside Unit A to verify the results of the past two samplings.

Industrial Hygiene sampling is performed on a periodic basis. Sampling at Units E and F will be conducted during 2004. Collocated worker monitoring occurs at least once per year, or more often as deemed necessary. The monitoring station is mobile and has traditionally been deployed near the units where the highest contaminate concentrations would likely occur. The monitoring station, however, can be moved to any location on the 50-m (55-yd) grid modeled in EDF-1901.

5.4 Vapor Vacuum Extraction with Treatment Performance Monitoring

Influent and effluent vapor sampling and analysis are performed to measure performance of the catalyst at Units D, E, and F. Performance testing is completed using FTIRS as described in *Test Plan for Catalytic Oxidizer Performance Testing for Operable Unit 7-08 Organic Contamination in the Vadose Zone Project* (McMurtrey 2004). Technical and functional requirements for the analytical system, the rationale used in selection of the analytical apparatus, and a discussion of anticipated instrument detection limits are detailed in EDF-3227, "Technical and Functional Requirements for Performance Testing of Vapor Vacuum Extraction with Treatment Units for the Operable Unit 7-08 Organic Contamination in the Vadose Zone Project."

Objectives of the performance testing are to determine the following information:

- Changes or reductions in catalyst activity over time
- Direct measurement of organic and inorganic hazardous air pollutant emissions to augment air dispersion modeling efforts
- Destruction and removal efficiency for CCl_4
- Discharge concentrations of HCl
- Distribution of oxidation products
- Speciation and quantities of detected products of incomplete oxidation.

Excluded from test objectives is the determination of particulate and metals emissions.

The VVET performance testing provides representative quantitation of the catalytic oxidizer feed and exhaust gases. Testing is performed at the SDA with the catalytic oxidizers in full-scale operation in accordance with TRP-6859, "Performance Testing of Organic Contamination in the Vadose Zone Vapor Vacuum Extraction with Treatment Systems" (see Appendix B). At each unit, one to three 100-hour testing campaigns are conducted each year. If possible, campaigns will be scheduled to coincide with the renewal of operations after a rebound period. The testing is completed using VOC vapor extracted from the vadose zone in the course of normal operations. Analysis of the inlet gas is completed to quantify the feed rate for each contaminant. Similarly, the exhaust gas is analyzed to determine the mass rate of contaminant discharge and the chlorinated off-gas product distribution. Standard gases will be used to validate performance of the analytical system and to ensure the quality of data collected. The DRE for CCl_4 set for the procurement of the original catalytic oxidizer is used as the system efficiency goal.

Performance testing using the FTIR began in late 2003 at Unit D. At this time, hydrofluoric acid was detected in the exhaust stream from the catalytic oxidation of Freon-113. The FTIR will track the DRE of

the catalyst to ensure that the fluorine is not degrading the catalyst at an accelerated rate. At the end of the catalysts' operational lifetime, the catalyst will be replaced with a more fluorine-tolerant catalyst.

An acid scrubber for the unit exhaust stream is scheduled for deployment in the FTIR in 2004 to prevent any damage that may occur due to the acidic nature of the exhaust; any waste from the acid scrubber will be dispositioned according to the method designated by WGS. Performance testing will be performed at Units D, E, and F during 2004. The test results will be published on an annual basis in test reports.

6. ORGANIC CONTAMINATION IN THE VADOSE ZONE WELL VAPOR MONITORING

The remedial action includes installation, operation, and maintenance of OCVZ vapor monitoring and extraction wells to optimize VOC mass removal. Monitoring is conducted in accordance with the *Field Sampling Plan for Operations and Monitoring Sampling Conducted in Support of the Organic Contamination in the Vadose Zone Remediation Project* (Housley 2004).

6.1 Organic Contamination in the Vadose Zone Vapor and Extraction Wells

Figure 2 provides a map of the vapor and extraction well locations at the SDA and Figures 3 and 4 show the extraction intervals for OCVZ wells. Figure 5 lists the vapor port depths for all OCVZ monitoring wells inside and outside the SDA.

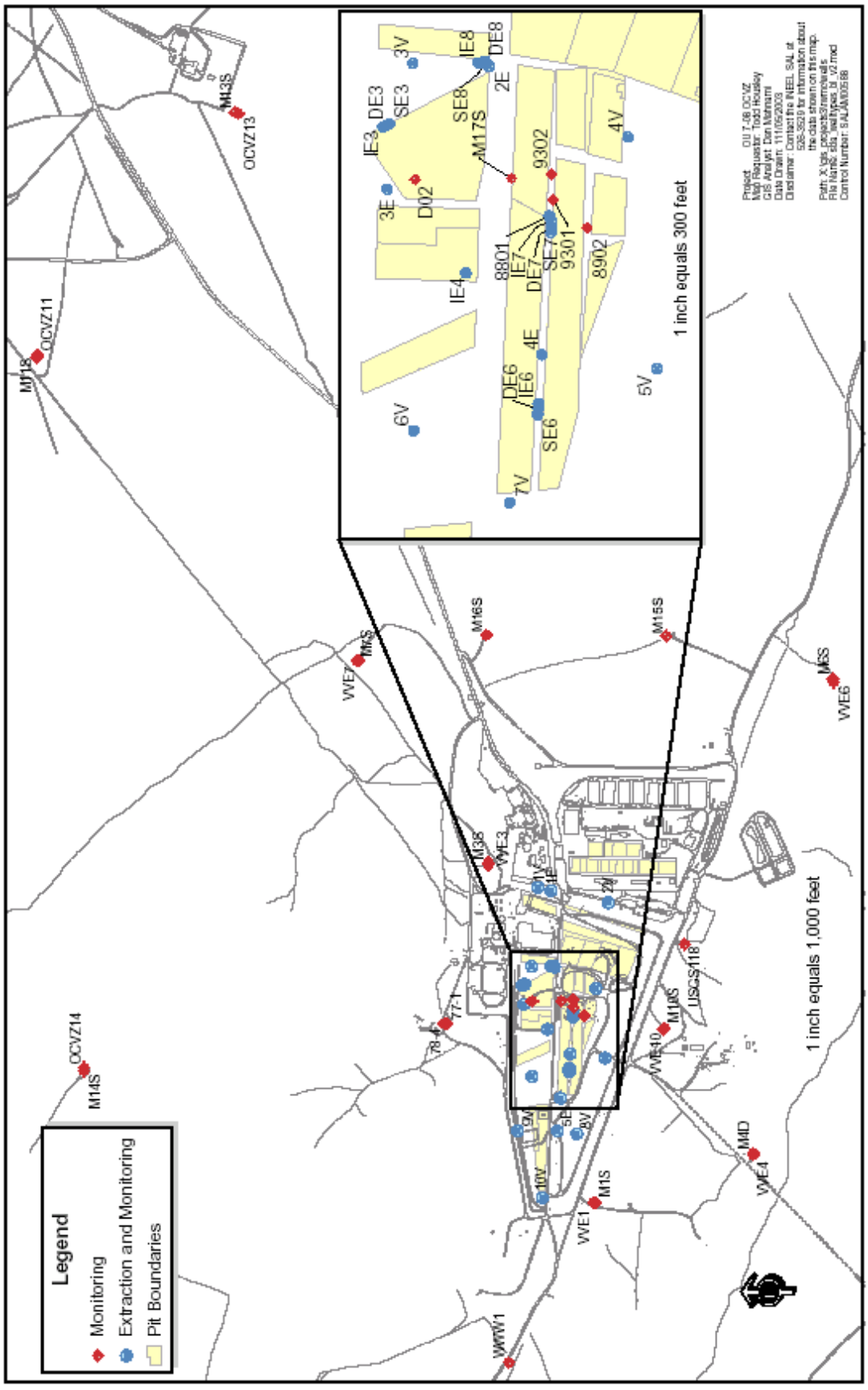

Figure 2. Organic contamination in the vadose zone monitoring wells in the vicinity of the Radioactive Waste Management Complex.

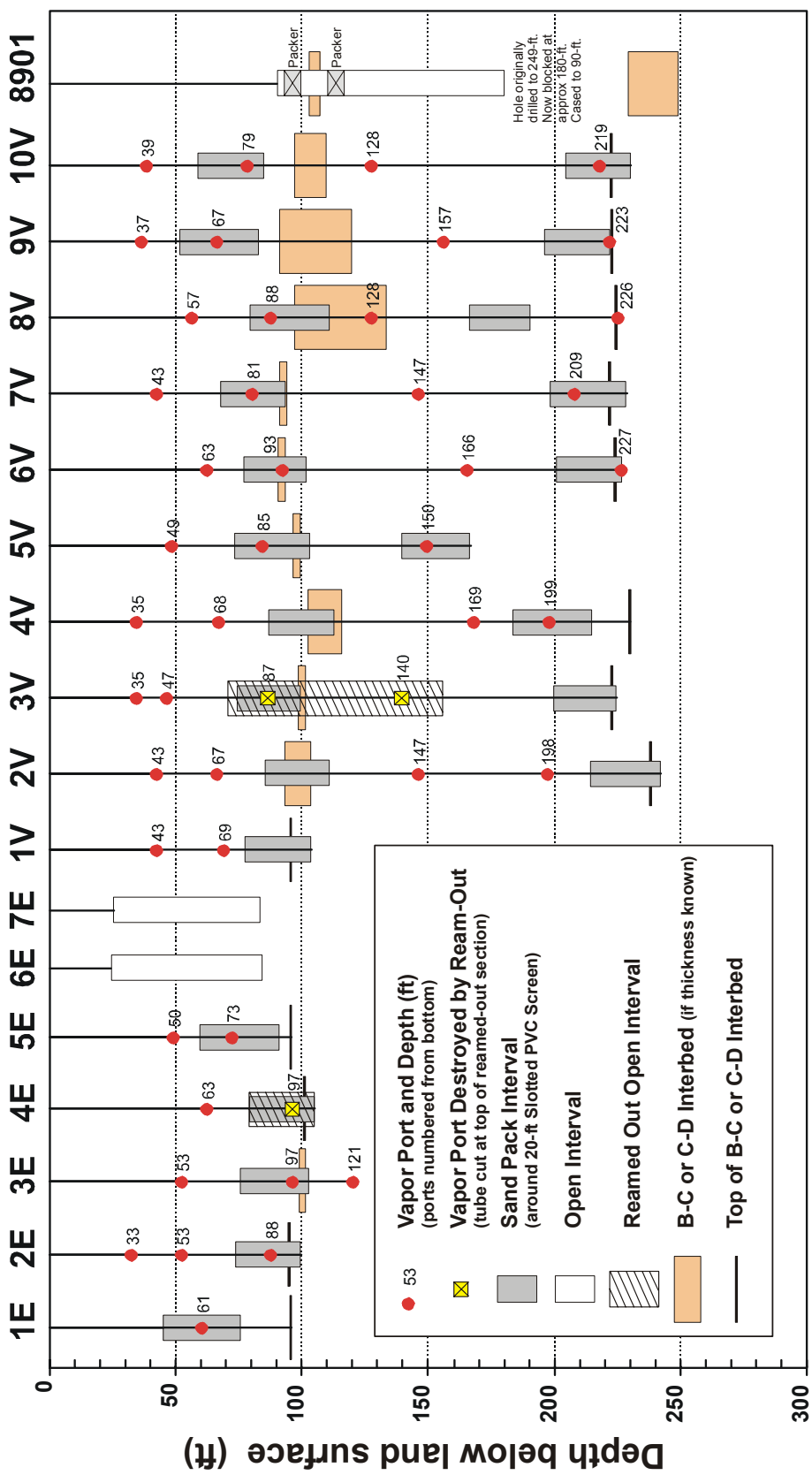

Figure 3. Extraction intervals and vapor port depths in organic contamination in the vadose zone wells with an extraction interval at the Subsurface Disposal Area (Part I).

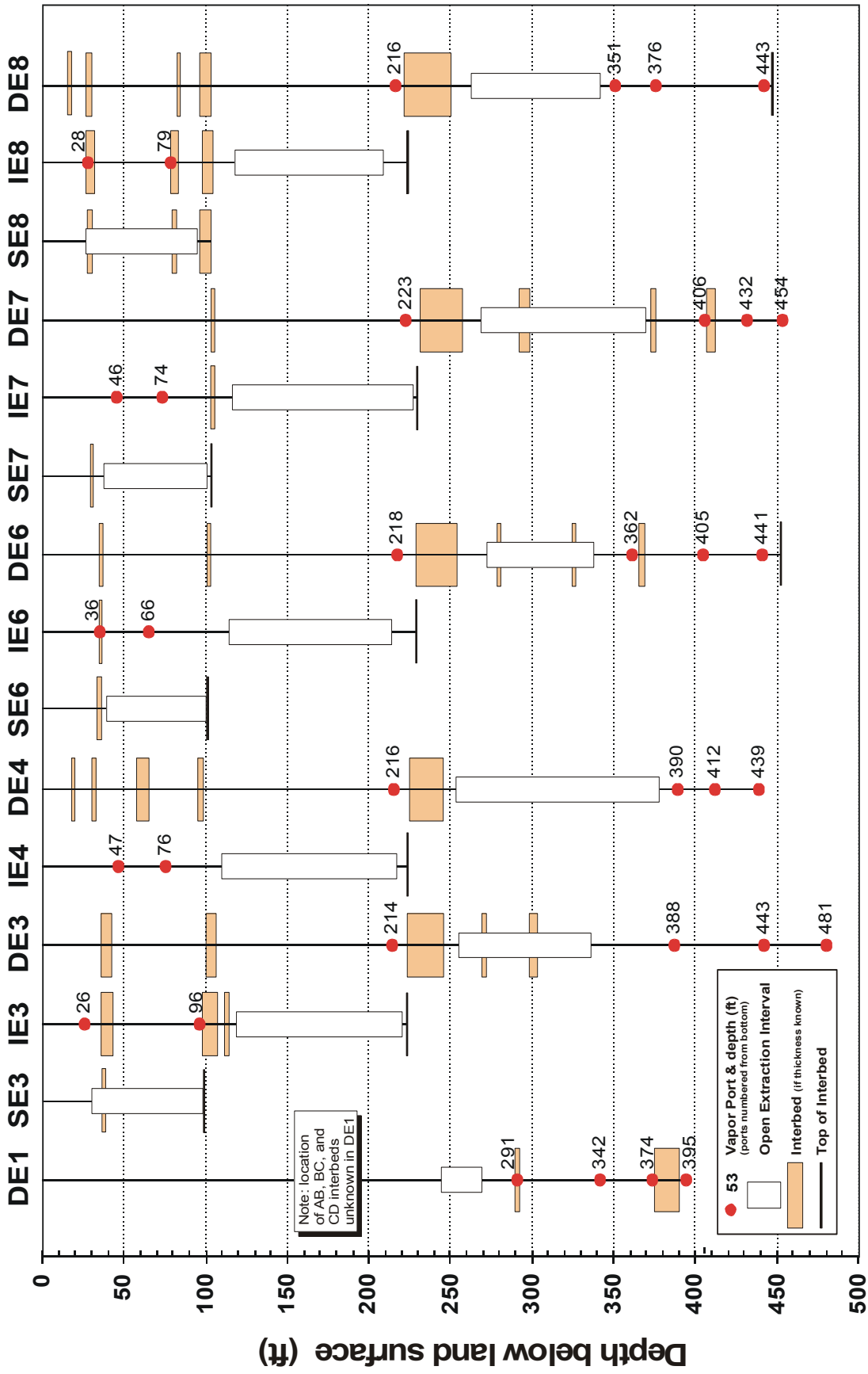

Figure 4. Extraction intervals and vapor port depths in organic contamination in the vadose zone wells with an extraction interval at the Subsurface Disposal Area (Part II).

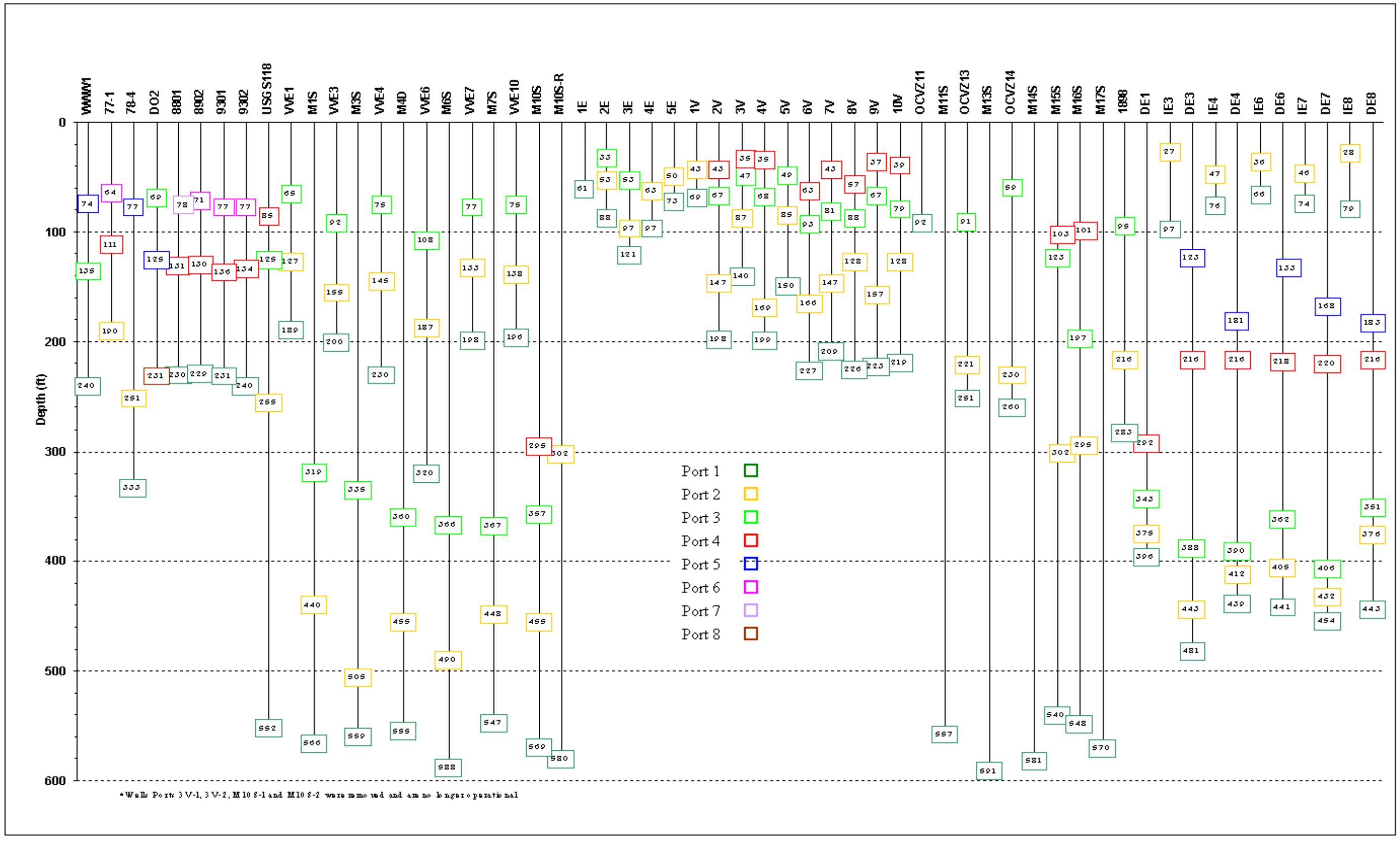

Figure 5. Vapor port depths in organic contamination in the vadose zone vapor monitoring wells located inside the Subsurface Disposal Area.

7. ROLES AND RESPONSIBILITIES

This section identifies the roles and responsibilities of key OU 7-08 Project personnel. Figure 6 presents the OU 7-08 Project organization chart.

7.1 Operable Unit 7-08 Project Personnel

7.1.1 Project Manager

The project manager is responsible for ensuring that all activities conducted during this project comply with INEEL MCPs, PRDs, and all applicable OSHA, EPA, DOE, U.S. Department of Transportation, and State of Idaho requirements. The project manager also ensures that tasks are performed in accordance with the "Project Execution Plan for the Balance of INEEL Cleanup Project" (PLN-694). The project manager coordinates all document preparation and field, laboratory, and modeling activities, and is responsible for the overall scope, schedule, and budget of the project. Additionally, the project manager interfaces with the RWMC in accordance with the "Interface Agreement between Radioactive Waste Management Complex and the Complete Balance of INEEL Cleanup Project" (IAG-20) This interface agreement defines the roles, responsibilities, approvals, and authorities between the Balance of INEEL Cleanup Project, and RWMC for all Balance of INEEL Cleanup Project activities conducted in and around the general area of the RWMC facility.

7.1.2 System or Project Engineer

The system or project engineer serves as the single point-of-contact for the project manager to resolve technical issues for each assigned VVET job from initiation to completion. The system or project engineer also provides the following:

- Weekly and monthly reports to the project manager on VVET system accomplishments, planned activities, and issues (with input from technicians, planners, and samplers)
- Technical review and approval of corrective maintenance, preventive maintenance, and predictive maintenance work control documents
- Coordination with assigned engineering personnel to complete configuration control and design criteria requirements for work orders that implement system structure and component modifications.

7.1.3 Operations Field Technician Lead

The VVET operations field technician lead is responsible for ensuring safe, efficient, reliable, and compliant VVET system operation including

- Coordinating and providing oversight for day-to-day VVET field activities and acting as the primary point of contact for access to the VVET system operation
- Interfacing with RWMC, construction, and vendor support personnel to ensure all construction and maintenance activities are conducted in accordance with the project HASP
- Assigning work activities to other VVET technicians
- Delegating lead technician responsibilities when unavailable.

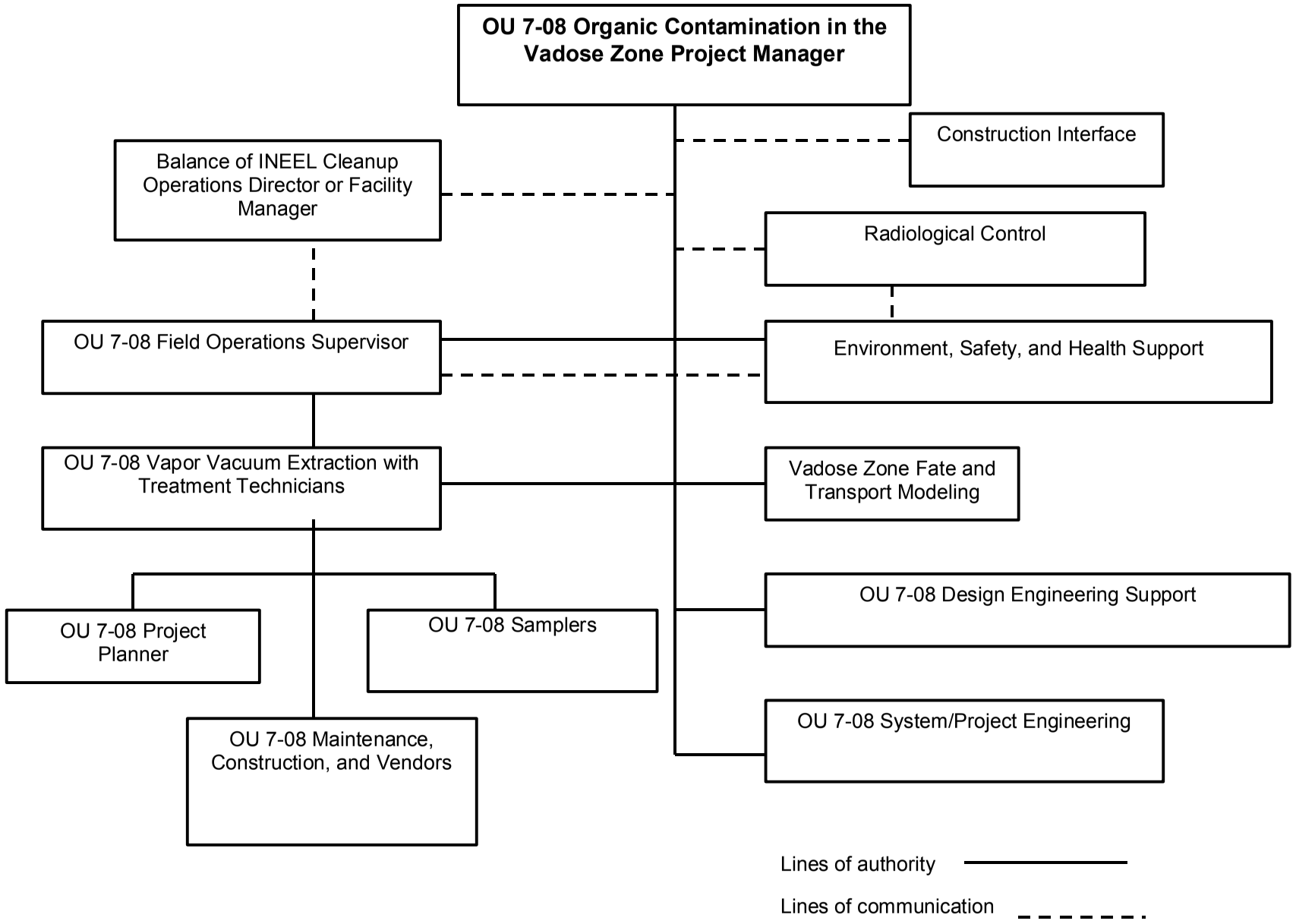

Figure 6. Organization chart of the Operable Unit 7-08 Organic Contamination in the Vadose Zone Project.

7.1.4 Operations Field Technicians

The VVET field technicians are responsible for performing routine surveillance and operational checks including completion of the daily round sheets and operating logbooks. They provide input to the planner for work orders in accordance with STD-101, "Integrated Work Control Process," for VVET system maintenance and upgrades and oversight, and support for VVET system monthly, quarterly, subcontractor, and annual preventive maintenance; VVET system corrective maintenance, upgrades, and instrument calibrations; maintenance and tracking of VVET system spare parts inventory; and planning, scheduling, and providing oversight for VVET system operations waste management activities. Technicians follow a VVET technician training plan and a qualification program to ensure they receive the training required to support safe performance of field activities. These activities include startup, operation, shutdown, and operational checks of the VVET units, and response to system abnormal conditions. The VVET technician training plan is provided in PLN-974, "Operable Unit 7-08 Organic Contamination in the Vadose Zone Vapor Vacuum Extraction with Treatment Technician Training Plan," and a copy of the OU 7-08 VVET technician training qualification checklist is provided in Appendix D.

7.1.5 Planner

The planner is responsible for the following:

- Preparing required work control documents for O&M work
- Ensuring that input to work orders is obtained from the system or project engineer
- Ensuring that field walkdowns are conducted by (at a minimum) the system or project engineer or designee, safety representative, quality representative, and RWMC representative, as required
- Tracking status of work control documents
- Ordering, storing, and maintaining inventory of spare parts, as identified by the system or project engineer.

7.1.6 Vadose Zone Sampler

The vadose zone sampler is responsible for the following:

- Performing monthly and quarterly sampling of vapor-monitoring wells, VOC analysis on VVET daily operational samples and monthly and quarterly well-vapor samples
- Maintaining sampling equipment (e.g., pumps and vapor ports) and analytical equipment (i.e., Bruel & Kjar gas analyzers)
- Reporting operational sample results to assigned engineering personnel to support mass-loss calculations
- Reporting well-vapor data to assigned engineering personnel to support development of well-vapor trending reports.

7.1.7 Vadose Zone Fate and Transport Modeler

The vadose zone fate and transport modeler is responsible for the following:

- Developing and maintaining the OU 7-08 vadose zone fate and transport model
- Calibrating the OU 7-08 vadose zone model to subsurface gas pressure data, operations removal data, subsurface monitoring data, and inventory data
- Conducting vadose zone model sensitivity and uncertainty analyses
- Providing technical input to the project manager to support the OCVZ operations strategy.

7.2 Environment, Safety, Health, and Quality Assurance Personnel

7.2.1 Health and Safety Officer

The OCVZ Project health and safety officer (HSO) is the person assigned to the task site as the primary contact for health and safety issues. The HSO advises the VVET operations field technician lead on the safety and health aspects of the OCVZ tasks, and is authorized to stop work at the task site if any operation threatens worker or public health or safety. The HSO may be assigned other responsibilities, as stated in other sections of the project HASP, as long as they do not interfere with the primary responsibilities of safety and health. The HSO will be supported as needed by Industrial Safety, Industrial Hygiene, Environmental, and Quality Assurance support personnel. The HSO duties will be performed by the VVET field technician lead or VVET field technician, if the primary HSO is not onsite.

7.2.2 Safety Professional

The assigned OCVZ Project safety professional reviews work packages, observes operational activities, assesses compliance with the INEEL safety and health manuals, signs safe work permits, advises the VVET technician on required safety equipment, answers questions on safety issues and concerns, and recommends solutions to safety issues and concerns that arise during operations. The safety professional may conduct periodic inspections in accordance with MCP-3449, “Safety and Health Inspections,” and may have other duties at the task site as specified in the project HASP, or in INEEL PRDs or MCPs. Additionally, the safety professional will support OCVZ Project management by investigating accidents and injuries and preparing written reports to project and functional management, hazard identification, and appropriate mitigation efforts.

7.2.3 Industrial Hygienist

The assigned OCVZ industrial hygienist is the primary source for information about nonradiological hazardous and toxic agents during operations. The industrial hygienist assesses the potential for worker exposures to hazardous agents in accordance with the INEEL safety and health manual MCPs, and accepted industry IH practices and protocol. By participating in work control development and approval processes, the industrial hygienist assesses and recommends appropriate hazard controls for the protection of Operations personnel, operates and maintains airborne sampling and monitoring equipment, reviews for effectiveness, and recommends and assesses the use of PPE required in the project HASP (recommending changes as appropriate).

7.2.4 Quality Assurance Engineer

Duties and responsibilities of the quality assurance engineer include the following:

- Implementing internal quality monitoring, assessment, and surveillance by establishing and maintaining an internal assessment and monitoring schedule

- Reviewing design and performance specifications and other design documents to determine whether quality requirements are properly included

- Ensuring quality assurance compliance is achieved in accordance with applicable requirements established by the company, DOE, state, and federal regulations.

7.2.5 Environmental Engineer

Responsibilities of the environmental engineer include the following:

- Providing overall technical expertise with respect to regulatory issues, natural and cultural resources, and risk assessment for the OCVZ Project

- Identifying environmental and regulatory issues that affect operations and developing solutions in coordination with the OCVZ Project engineer and other project task leads

- Working with the project task leads and management to develop appropriate mitigation measures that minimize potential noncompliance with environmental requirements when environmental issues are identified.

7.3 Radiological Control

7.3.1 Radiological Engineer

The radiological engineer provides radiological engineering support within the project. Specific duties and responsibilities include acting as point of contact for all radiation protection issues related to the project, ensuring that radiological hazards are identified and appropriate controls are implemented to maintain worker exposure to those hazards as low as reasonably achievable, and identifying conditions that may impede implementation of company standards for safety, quality, and O&M. The radiological engineer is also responsible for initiating actions to correct conditions that adversely impact safety, quality, or operations and maintenance, including stopping work if necessary.

7.3.2 Radiological Control Technicians

Radiological control technicians report directly to the facility radiological control technician foreman, and are responsible for ensuring compliance with the INEEL Radiological Control program within the OCVZ Project areas, including acting as a Radiological Control information resource for project personnel. Also, during emergencies, radiological control technicians are responsible for stopping work or ordering an area evacuated when an imminent radiation hazard exists and such actions are necessary to ensure worker safety.

7.4 Maintenance, Construction, and Vendor Support Personnel

7.4.1 Laborers and Heavy Equipment Operators

Specific duties and responsibilities for laborers and heavy equipment operators include operating heavy equipment, forklifts, and industrial vehicles to transport equipment and components to the site to support construction and maintenance activities.

7.4.2 Mechanics and Instrument Technicians

Maintenance personnel are responsible for maintenance and repair of project operations mechanical and electrical equipment. Personnel in this category include all maintenance crafts (e.g., electricians, mechanics, pipe fitters, instrument technicians, and carpenters), life-safety-systems technicians, and associated line management. The VVET technicians are responsible for specific maintenance and monitoring activities that include equipment maintenance, troubleshooting, repair, testing, instrument calibration, inspections, and data surveys.

7.4.3 Construction Support Personnel

Construction support personnel will perform VVET upgrades and maintenance activities where required. Construction support may include, but is not limited to, equipment operators, hoisting and rigging, laborers, and similar construction trades. The VVET technician will serve as the interface for all construction personnel at the OCVZ site.

7.4.4 Vapor Vacuum Extraction with Treatment Unit Vendors

Vendors provide VVET components, upgrade equipment, and structures for the existing units. The VVET technician will serve as the interface for all vendor personnel at the OCVZ site.

7.5 Visitors

All visitors with official business in the OCVZ Project operational areas (including INEEL personnel, representatives of DOE, and state or federal regulatory agencies) may not proceed beyond the RWMC operational area without taking the appropriate training (see Table 6-1 in the project HASP) as described below:

- Receiving OCVZ HASP training or an orientation briefing for the area to be accessed
- Signing applicable entry logs and work control documents (for the area to be accessed)
- Wearing the appropriate PPE.

A VVET technician will escort visitors entering the project operational areas.

Note 1: Visitors may not be allowed into OCVZ areas during certain activities (e.g., construction or maintenance) to minimize safety, health, and radiological hazards to the visitor(s). The determination as to any visitor's demonstrated need for access into the OCVZ Project area will be made by the VVET technician in consultation with assigned safety and health professionals and Radiological Control personnel.

Note 2: Visitors with no official business at OCVZ Project areas will not be permitted to enter project areas.

8. REFERENCES

29 CFR 1910, 2003, "Occupational Safety and Health Standards," *Code of Federal Regulations*, Office of the Federal Register.

40 CFR 61, 2003, "National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities," *Code of Federal Regulations,* Office of the Federal Register.

40 CFR 261, 2003, "Identification and Listing of Hazardous Waste," Section 261.10, "Criteria for Identifying the Characteristics of Hazardous Waste," *Code of Federal Regulations,* Office of the Federal Register.

40 CFR 264, 2003, "Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities," *Code of Federal Regulations,* Office of the Federal Register.

49 CFR 171, 2003, "General Information, Regulations, and Definitions," *Code of Federal Regulations,* Office of the Federal Register.

49 CFR 173, 2003, "Shippers—General Requirements for Shipments and Packagings," *Code of Federal Regulations,* Office of the Federal Register.

49 CFR 177, 2003, "Carriage by Public Highway," *Code of Federal Regulations,* Office of the Federal Register.

49 CFR 178, 2003, "Specifications for Packagings," *Code of Federal Regulations,* Office of the Federal Register.

49 CFR 179, 2003, "Specifications for Tank Cars," *Code of Federal Regulations,* Office of the Federal Register.

15 USC § 2601 et seq., 1976, "The Toxic Substances Control Act (TSCA) of 1976," *United States Code.*

42 USC § 6901 et seq., 1976, "Resource Conservation and Recovery Act of 1976 (Solid Waste Disposal Act)," *United States Code.*

42 USC § 9601 et seq., 1980, "Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA/Superfund)," *United States Code*.

ACGIH, 2000, *Threshold Limit Values Booklet*, American Conference of Governmental Industrial Hygienist.

ACGIH, 2001, *Threshold Limit Values Booklet*, American Conference of Governmental Industrial Hygienist.

ANSI Z540-1, 1994, "American National Standard for Calibration—Calibration Laboratories and Measuring and Test Equipment General Requirements," ANSI/NCSL Z540-1-94, American National Standards Institute, National Conference of Standards Laboratories.

DOE O 5820.2A, 1988, "Radioactive Waste Management," U.S. Department of Energy.

DOE-ID, 1994, *Record of Decision: Declaration for Organic Contamination in the Vadose Zone Operable Unit 7-08, Idaho National Engineering Laboratory, Radioactive Waste Management Complex, Subsurface Disposal Area*, Administrative Record No. 5761, U.S. Department of Energy Idaho Operations Office; U.S. Environmental Protection Agency, Region 10; and Idaho Department of Health and Welfare.

DOE-ID, 2000, *U.S. Department of Energy, Idaho Operations Office Idaho National Engineering and Environmental Laboratory Pollution Prevention Plan,* DOE/ID-10333, Rev. 0, U.S. Department of Energy Idaho Operations Office.

DOE-ID, 2004, *Idaho National Engineering and Environmental Laboratory Reusable Property, Recyclable Materials, and Waste Acceptance Criteria (RRWAC)*, DOE/ID-10381, Rev. 20, U.S. Department of Energy Idaho Operations Office.

EDF-1901, 2004, "Operable Unit 7-08 Air Dispersion Modeling and Health Effects from Thermal and Catalytic Oxidation Unit Emissions at the Radioactive Waste Management Complex," Rev. 1, Idaho Completion Project.

EDF-3227, 2003, "Technical and Functional Requirements for Performance Testing of Vapor Vacuum Extraction with Treatment Units for the OU 7-08 Organic Contamination in the Vadose Zone Project," Rev. 0, Idaho National Engineering and Environmental Laboratory.

EPA, 1995, *User's Guide for the Industrial Source Complex (ISC3) Dispersion Models*, EPA-450/B-95-003a, U.S. Environmental Protection Agency.

Form 434.14, 2003, "Pre-Job Briefing Checklist," Rev. 7, Idaho National Engineering and Environmental Laboratory.

Harvego, Lisa A., 2002, *Air Monitoring Results of the Subsurface Disposal Area at the Radioactive Waste Management Complex for Operable Unit 7-08 Organic Contamination in the Vadose Zone 2001 Supplement*, INEEL/EXT-2000-00039, EDF-ER-125, Rev. 0, Idaho National Engineering and Environmental Laboratory.

Housley, L. T., 2004, *Field Sampling Plan for Operations And Monitoring Sampling Conducted in Support of the Organic Contamination in the Vadose Zone Remediation Project*, INEEL/EXT-99-00907, Rev. 2, Idaho National Engineering and Environmental Laboratory.

IAG-20, 2004, "Interface Agreement between Radioactive Waste Management Complex and the Complete Balance of INEEL Cleanup Project," Rev. 4, Idaho National Engineering and Environmental Laboratory.

IDAPA 58.01.01.210.10, 1995, "Idaho Demonstration of Preconstruction Compliance with Toxic Standards," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

IDAPA 58.01.01.577, 1994, "Ambient Air Quality Standards for Specific Air Pollutants," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

IDAPA 58.01.01.585, 1995, "Idaho Toxic Air Pollutants Non-Carcinogenic Increments," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

IDAPA 58.01.01.586, 2001, "Idaho Toxic Air Pollutants Carcinogenic Increments," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

IDAPA 58.01.01.651, 1994, "Idaho Rules for Control of Fugitive Dust," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

IDAPA 58.01.05.500.05, 2004, "Idaho Rules and Standards for Hazardous Waste," Idaho Administrative Procedures Act, Idaho Department of Environmental Quality.

INEEL, 2000, *Data Quality Objectives Summary Report for the Operable 7-08 Post-ROD Sampling*, INEEL/EXT-2000-00814, Rev. 0, Idaho National Engineering and Environmental Laboratory.

Manual 17, 2004, *Manual 17 - Waste Management*, Rev. 71, Idaho National Engineering and Environmental Laboratory.

MCP-2377, 2003, "Development, Assessment, and Maintenance of Drawings," Rev. 8, Idaho National Engineering and Environmental Laboratory.

MCP-3003, 2003, "Performing Pre-Job Briefings and Post-Job Reviews," Rev. 11, Idaho National Engineering and Environmental Laboratory.

MCP-3449, 2003, "Safety and Health Inspections," Rev. 3, Idaho National Engineering and Environmental Laboratory.

MCP-3534, 2001, "Use of Registered Professional Engineers," Rev. 2, Idaho National Engineering and Environmental Laboratory.

Miller, Bruce P. and Kelly Wooley, 2003, *Health and Safety Plan for Vapor Vacuum Extraction with Treatment for Operable Unit 7-08, Organic Contamination in the Vadose Zone*, INEEL/EXT-03-00467, Rev. 0, Idaho National Engineering and Environmental Laboratory.

PLN-687, 2003, "Vapor Vacuum Extraction and Treatment Software Configuration Management Plan," Rev. 2, Idaho National Engineering and Environmental Laboratory.

PLN-694, 2004, "Project Execution Plan for the Balance of INEEL Cleanup Project," Rev. 5, Idaho Completion Project.

PLN-1240, 2004, "Test Plan for Catalytic Oxidizer Performance Testing for Operable Unit 7-08 Organic Contamination in the Vadose Zone Project," Rev. 0, Idaho Completion Project.

Scientech, 1995, *Organic Contamination in the Vadose Zone Remedial Design/Remedial Action Work Plan Operable Unit 7-08 Radioactive Waste Management Complex Subsurface Disposal Area*, SCIE-COM-200-95, Scientech.

SDD-174, 2003, "OU 7-08, Organic Contamination in the Vadose Zone, Vapor Vacuum Extraction with Treatment: VVET Unit D," Rev. 0, Idaho National Engineering and Environmental Laboratory.

SDD-175, 2004, "System Design Description for Vapor Vacuum Extraction with Treatment Units E and F for the Operable Unit 7-08 Organic Contamination in the Vadose Zone Project," Rev. 0, Idaho National Engineering and Environmental Laboratory.

Soelberg, Nicholas R., 2000, *Operable Unit 7-08 Test Plan for the Catalytic Oxidizer Performance Test*, INEEL/EXT-2000-01406, Rev. 0, Idaho National Engineering and Environmental Laboratory.

Soelberg, Nicholas R., Ferron D. East, Roy D. Woodvine, James D. Atkinson, and L. Todd Housley, 2001, *Operable Unit 7-08 Catalytic Oxidizer Performance Test Report*, INEEL/EXT-2000-01611, Rev. 0, Idaho National Engineering and Environmental Laboratory.

STD-101, 2003, "Integrated Work Control Process," Rev. 15, Idaho National Engineering and Environmental Laboratory.

TPR-1634, 2004, "VVET Units E and F Catalytic Oxidizer Startup, Operation, and Shutdown," Rev. 4, Idaho Completion Project.

TPR-1662, 2004, "VVET Catalytic Oxidizer Startup, Operations, and Shutdown," Rev. 5, Idaho Completion Project.

TRP-6859, 2004, "Performance Testing of Organic Contamination in the Vadose Zone Vapor Vacuum Extraction with Treatment Systems," Rev. 1, Idaho Completion Project.

Appendix A

Unit Drawings

Appendix A

Unit Drawings

This appendix contains the Vapor Vacuum Extraction with Treatment Units D, E, and F catalytic oxidizer piping and instrumentation diagrams.

VVET Unit D

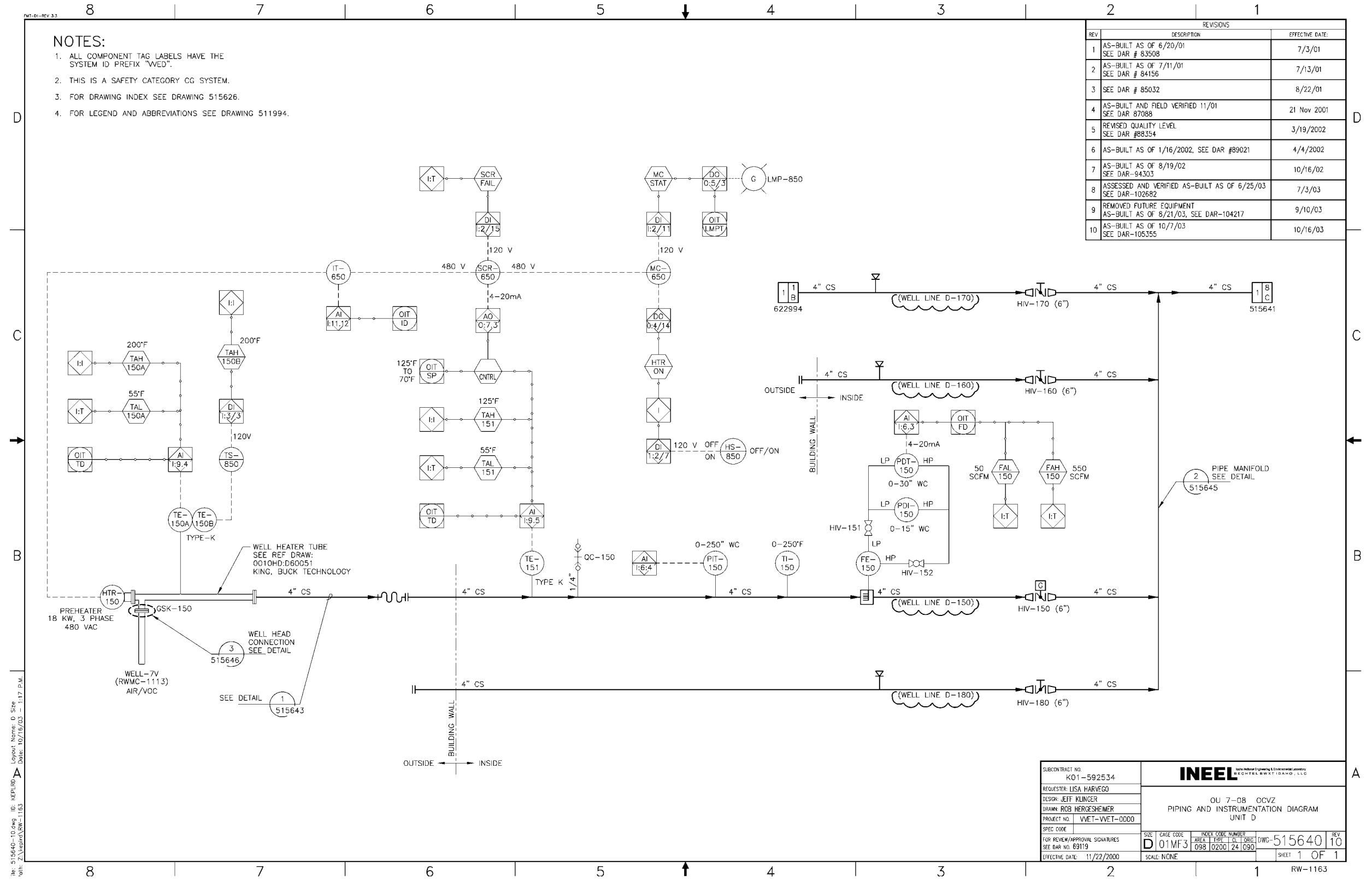

Figure A-1. OU 7-08 OCVZ Piping and Instrumentation Diagram, Unit D, Drawing No. 515640, Rev. 10.

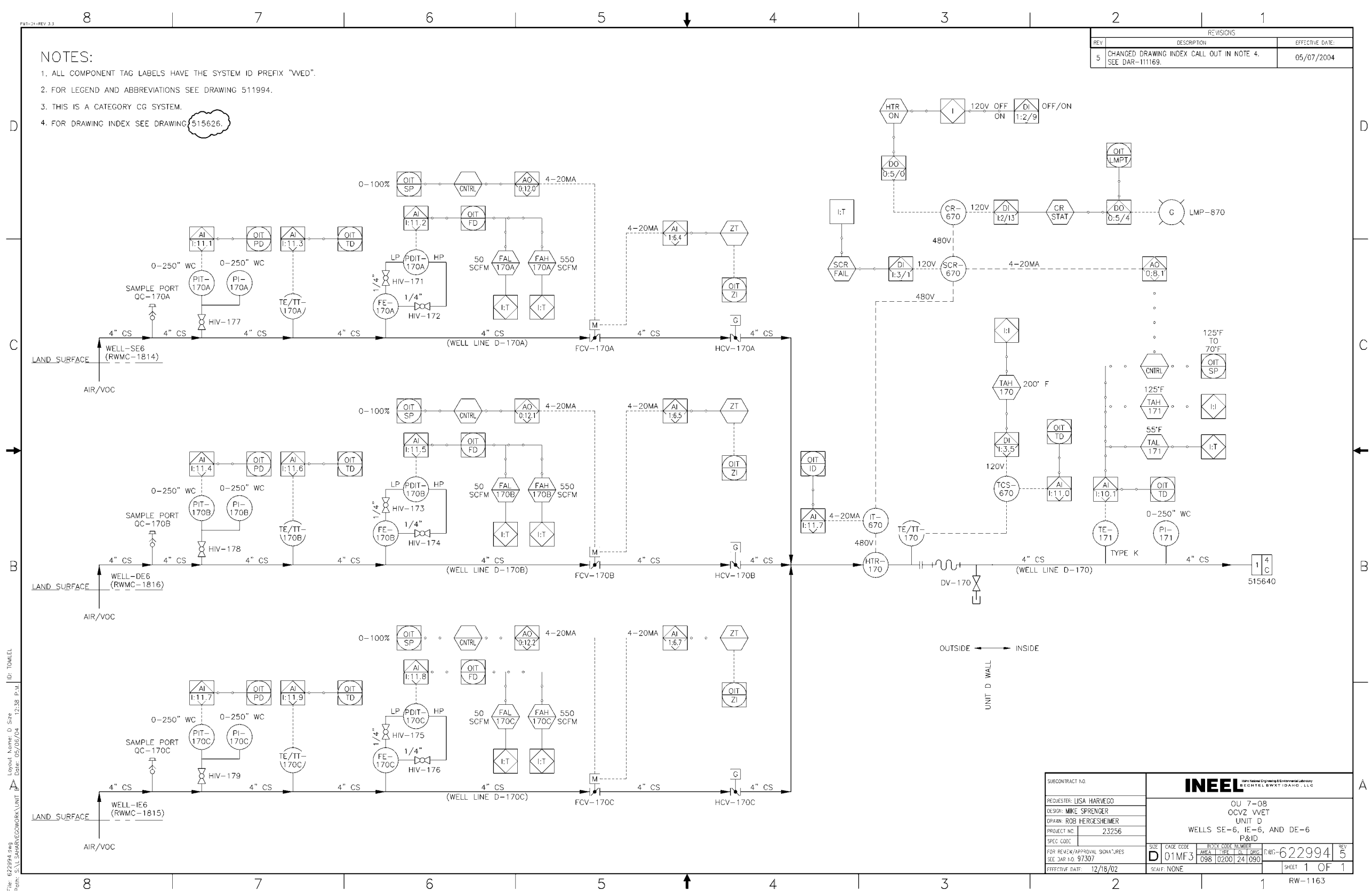

Figure A-2. OU 7-08 OCVZ VVET Unit D, Wells SE-6, IE-6, and DE-6 P&ID, Drawing No. 622994, Rev. 5.

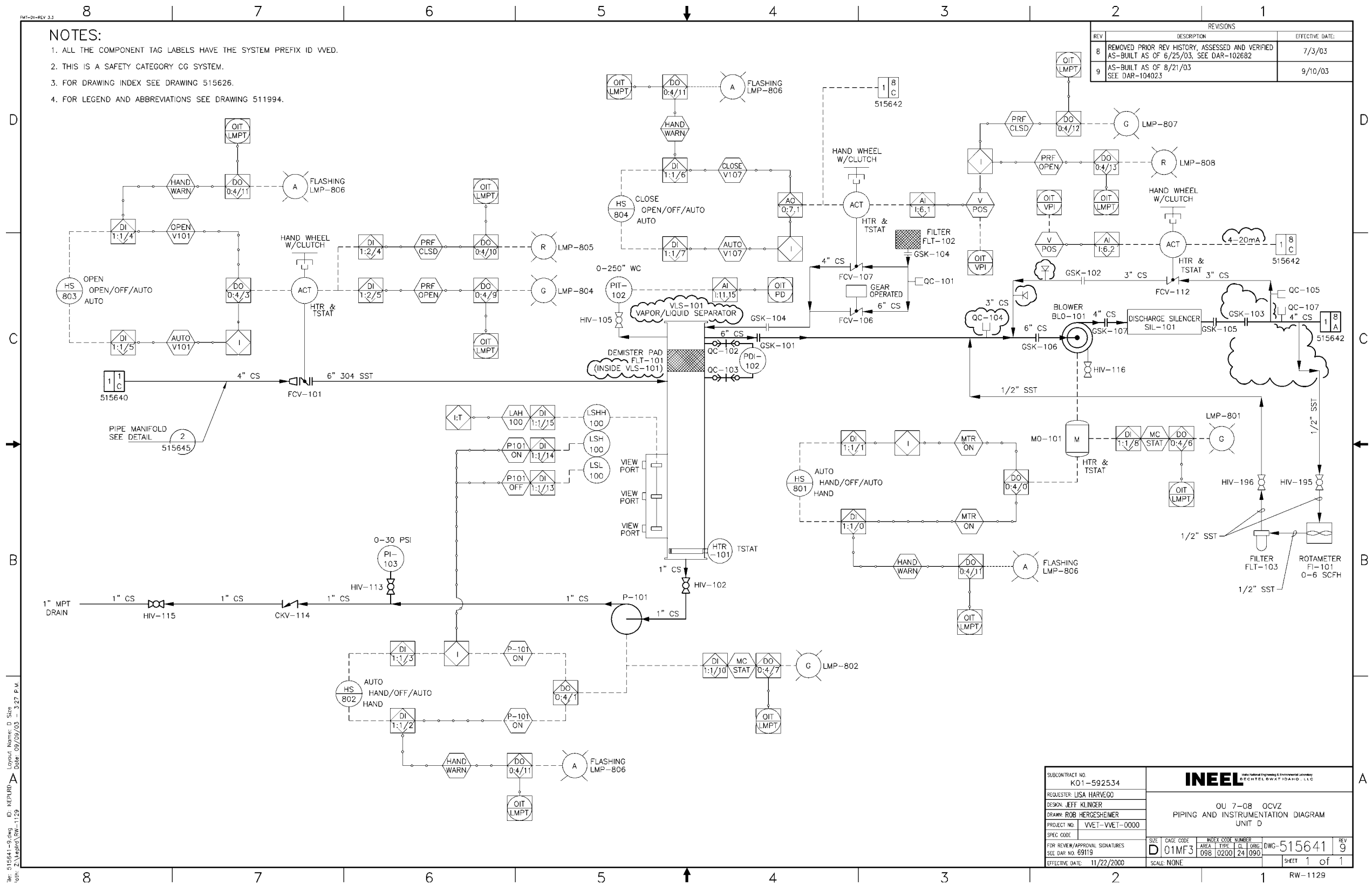

Figure A-3. OU 7-08 OCVZ Piping and Instrumentation Diagram, Unit D, Drawing No. 515641, Rev. 9.

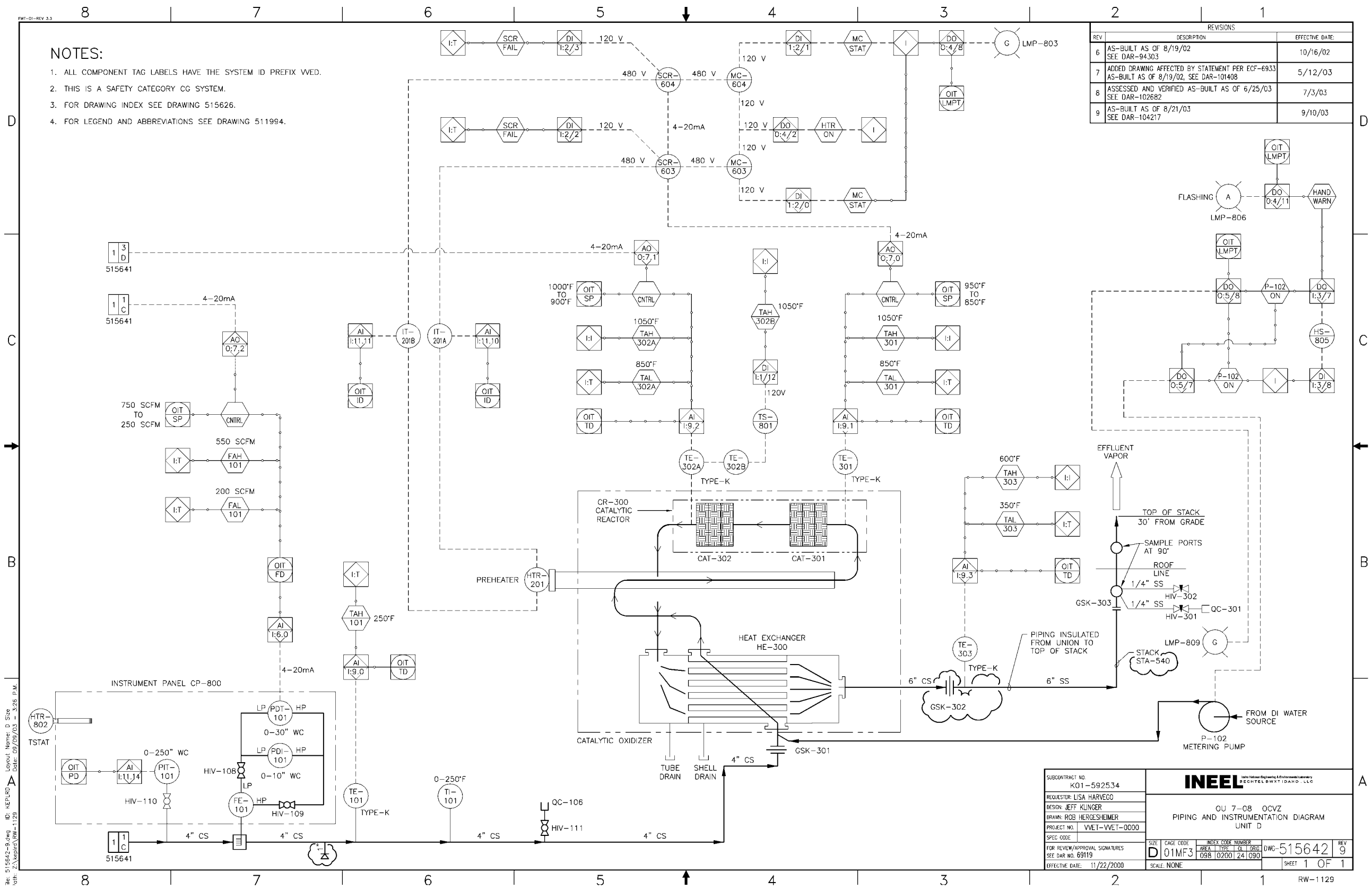

Figure A-4. OU 7-08 OCVZ Piping and Instrumentation Diagram, Unit D, Drawing No. 515642, Rev. 9.

FMT-01-REV 3.3

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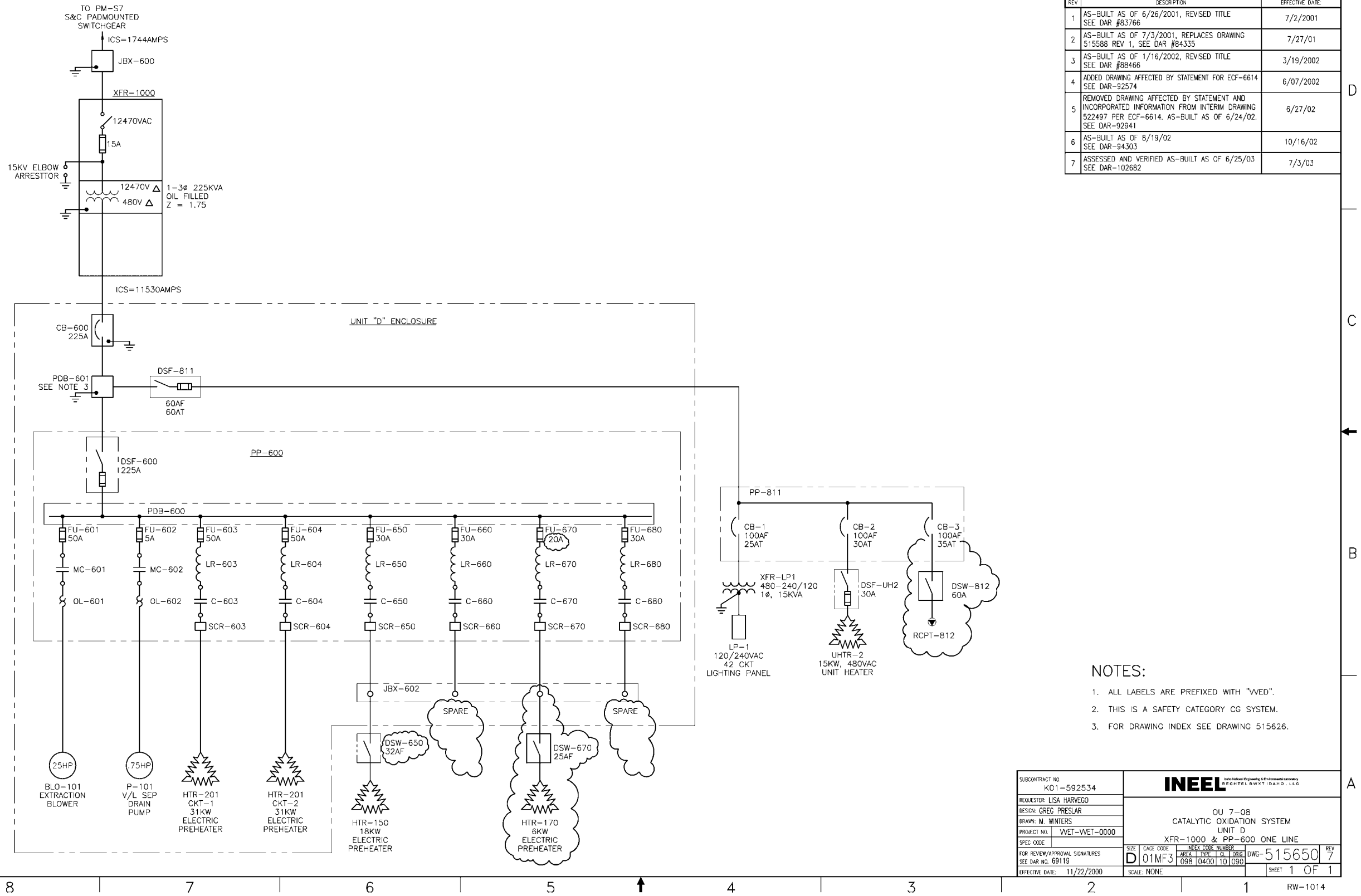
1	AS-BUILT AS OF 6/26/2001, REVISED TITLE SEE DAR #83766	7/2/2001
2	AS-BUILT AS OF 7/3/2001, REPLACES DRAWING 515588 REV 1, SEE DAR #84335	7/27/01
3	AS-BUILT AS OF 1/16/2002, REVISED TITLE SEE DAR #88466	3/19/2002
4	ADDED DRAWING AFFECTED BY STATEMENT FOR ECF-6614 SEE DAR-92574	6/07/2002
5	REMOVED DRAWING AFFECTED BY STATEMENT AND INCORPORATED INFORMATION FROM INTERIM DRAWING 522497 PER ECF-6614. AS-BUILT AS OF 6/24/02. SEE DAR-92941	6/27/02
6	AS-BUILT AS OF 8/19/02 SEE DAR-94303	10/16/02
7	ASSESSED AND VERIFIED AS-BUILT AS OF 6/25/03 SEE DAR-102682	7/3/03



NOTES:

1. ALL LABELS ARE PREFIXED WITH "VVED".
2. THIS IS A SAFETY CATEGORY CG SYSTEM.
3. FOR DRAWING INDEX SEE DRAWING 515626.

SUBCONTRACT NO.	KO1-592534
REQUESTER:	LISA HARVEGO
DESIGN:	GREG PRESLAR
DRAWN:	M. WINTERS
PROJECT NO.	WET-WET-0000
SPEC CODE	
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO.	69119
EFFECTIVE DATE:	11/22/2000

INEEL — Idaho National Engineering & Environmental Laboratory, BECHTEL BWXT IDAHO, LLC

OU 7-08
CATALYTIC OXIDATION SYSTEM
UNIT D
XFR-1000 & PP-600 ONE LINE

SIZE	CAGE CODE	INDEX CODE NUMBER (AREA / TYPE / SI / ORG)	DWG-	REV
D	01MF3	098 / 0400 / 10 / 090	515650	7

SCALE: NONE — SHEET 1 OF 1

RW-1014

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Figure A-5. OU 7-08 Catalytic Oxidation System, Unit D, XFR-1000 and PP-600 One Line, Drawing No. 515650, Rev. 7.

FMT-01-REV 3.3

REVISIONS		
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–	REPLACES 511990 SH 2 REV 3	
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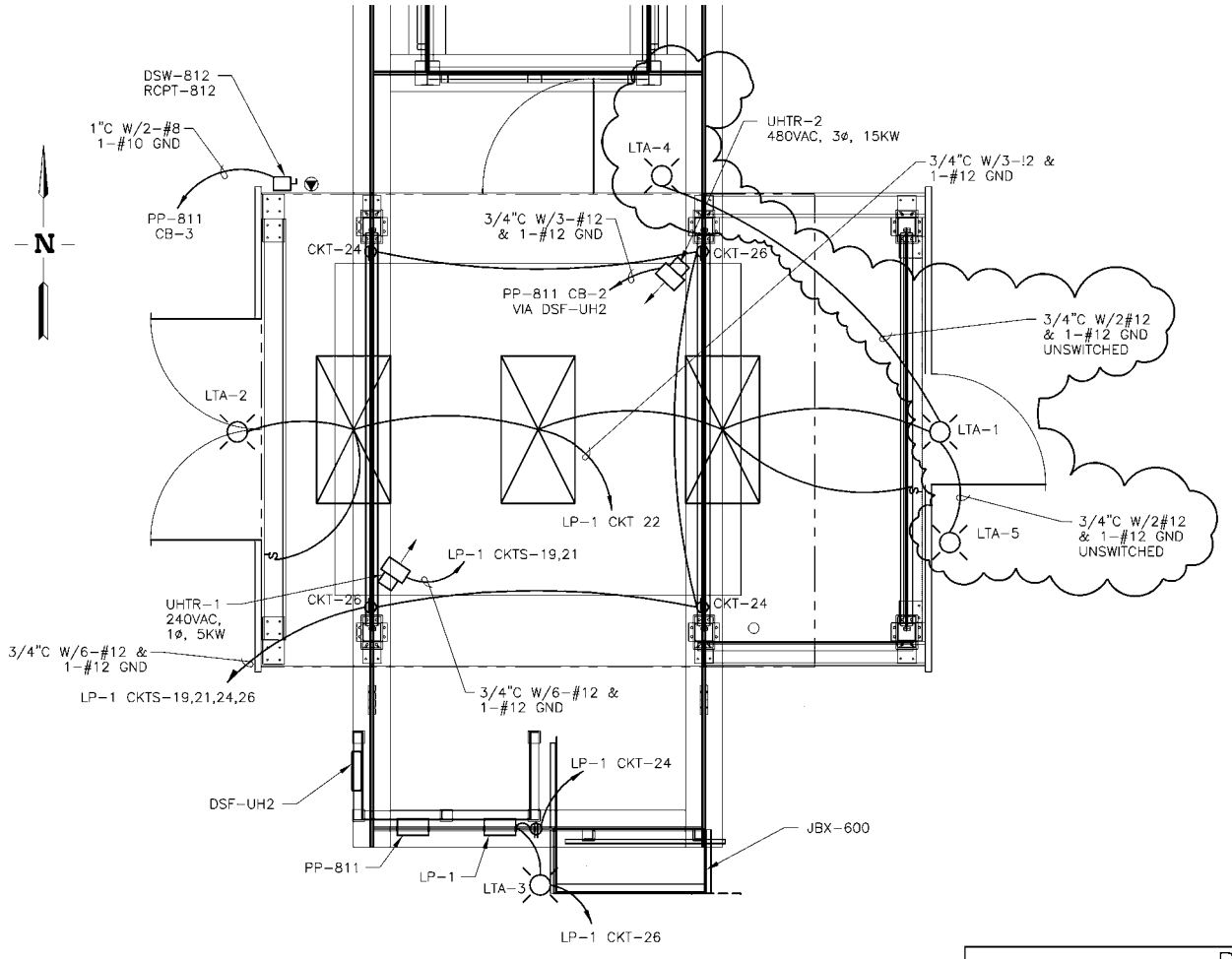
2	ASSESSED AND VERIFIED AS-BUILT AS OF 6/25/03 SEE DAR-102682	7/3/03
3	ASSESSED AND VERIFIED AS-BUILT AS OF 11/11/03 SEE DAR-106474	11/13/03



ELECTRICAL PLAN
SCALE: 1/2"=1'-0"

PANEL LP-1 LOCATION UNIT D

AMPS 100 MAIN 100 WIRE Ø TYPE
VOLTAGE 240/120 FEED MOUNTING DIM.

BRANCH CIRCUIT	LINE	LOAD WATTS	AMP TRIP	CKT NO.	CKT NO.	AMP TRIP	LOAD WATTS	LINE	BRANCH CIRCUIT
BLANK				1	2				BLANK
				3	4				
				5	6				
				7	8				
				9	10				
BLANK				11	12				BLANK
HTR-101		500	15	13	14	15	670		ACU-801
SPARE			30	15	16	20	1200		PP-600 CONTROL PANEL
				17	18	15			SPARE
UHTR-1		2500	30	19	20	15	600		HTR-801, 802
				21	22	20	640		ENCLOSURE LGTS/SENSOR LGT
HTT-101		240	20	23	24	20	540		RCPTS (ENCLOSURE & OUTSIDE)
FCV-170A, B & C, RCPT-800A, B & C		540	20	25	26	20	460		RCPT (ENCLOSURE) SKID LGT (SOUTH)
BLANK				27	28				BLANK
				29	30				
				31	32				
				33	34				
				35	36				
BLANK				37	38				
MAIN (B PHASE)			100	39	40				
(A PHASE)				41	42				BLANK

TOTAL LOAD/LINE-WATTS A 3830 B 4060 FED FROM XFR-LP1
AMPS/LINE A B
WIRE SIZE 3-#1 & 1-#8 GND CONDUIT SIZE 1 1/2"

PANEL PP-811

AMPS – LOCATION UNIT "D" SKID
VOLTAGE – FEED –

BRKR NO.	BRANCH CIRCUIT	A	B	C	CB SIZE	FRAME
CB1	XFR-LP1	7500				
			7500		25	100
				–		
CB2	UHTR-2 VIA DSF-UH2	5000				
			5000		30	100
				5000		
CB3	RCPT-812 VIA DSW-812	–				
			7500			
				7500	35	100

TOTAL LOAD/PHASE-WATTS A 12,500 B 20,000 C 12,500
AMPS/PHASE A B C

FED FROM DSW-811
CONDUIT SIZE 1"
WIRE SIZE 3-#6 & 1-#8 GND

X-REF DRAWING
515680.DWG

NOTES:

1. THIS IS A SAFETY CATEGORY CG SYSTEM.
2. FOR DRAWING INDEX SEE DRAWING 515626.
3. ALL LABELS ARE PREFIXED WITH VVED.

SUBCONTRACT NO.	INEEL Idaho National Engineering & Environmental Laboratory BECHTEL BWXT IDAHO, LLC
REQUESTER: LISA HARVEGO	
DESIGN: GREG PRESLAR	
DRAWN: M WINTERS	GR OXIDIZER SYSTEM UNIT D ELECTRICAL PLAN & PANEL SCHEDULES
PROJECT NO.	
SPEC CODE: VVET-VVET-0000	
FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 88291	SIZE D | CAGE CODE 01MF3 | INDEX CODE NUMBER AREA 098 | TYPE 0400 | Q. 10 | SEQ. 090 | DWG-519784 | REV 3
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Figure A-6. GR Oxidizer System, Unit D, Electrical Plan and Panel Schedules, Drawing No. 519784, Rev. 3.

VVET Unit E

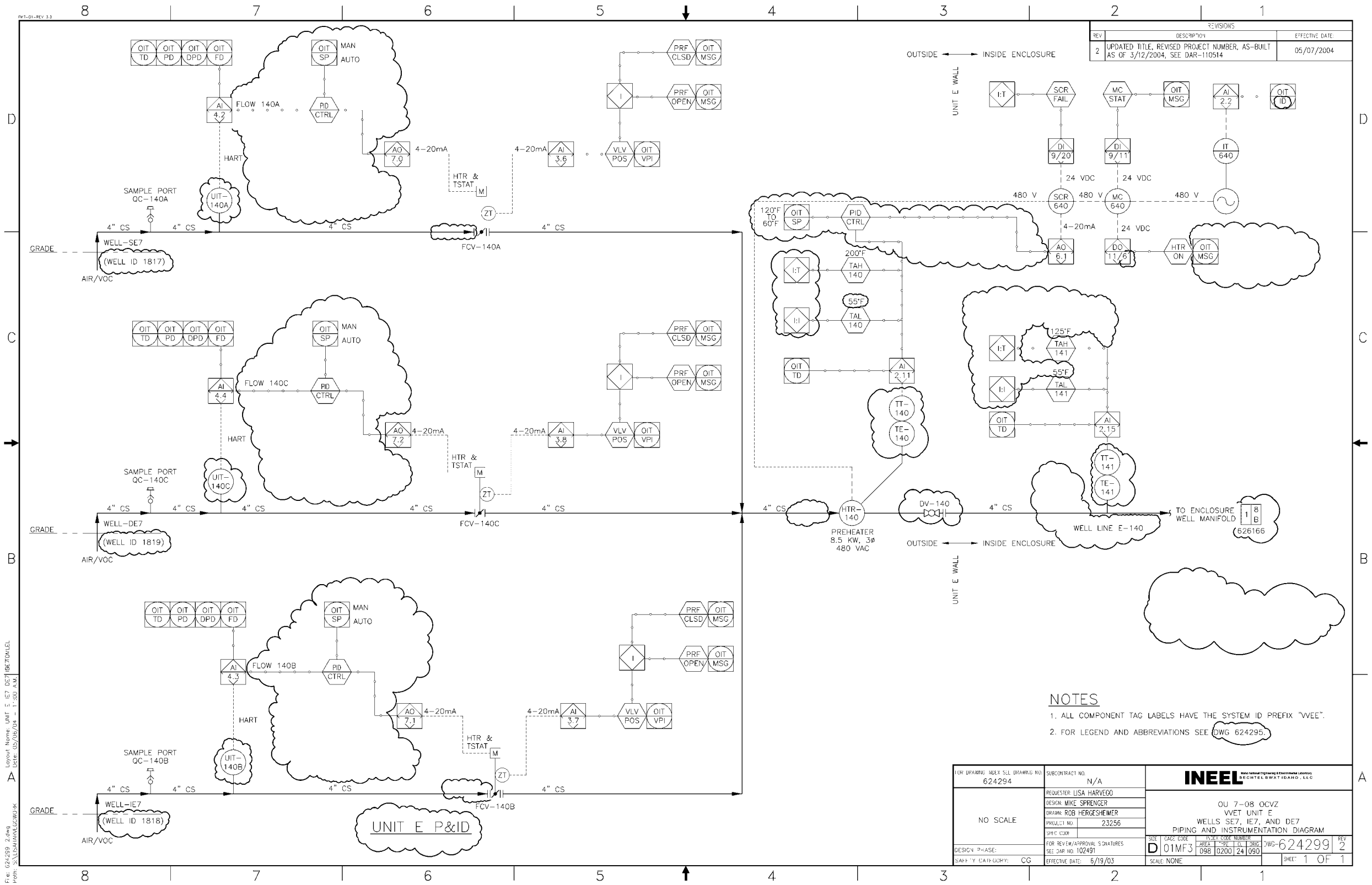

Figure A-7. OU 7-08 OCVZ VVET Unit E, Wells SE7, IE7, and DE7 Piping and Instrumentation Diagram, Drawing No. 624299, Rev. 2.

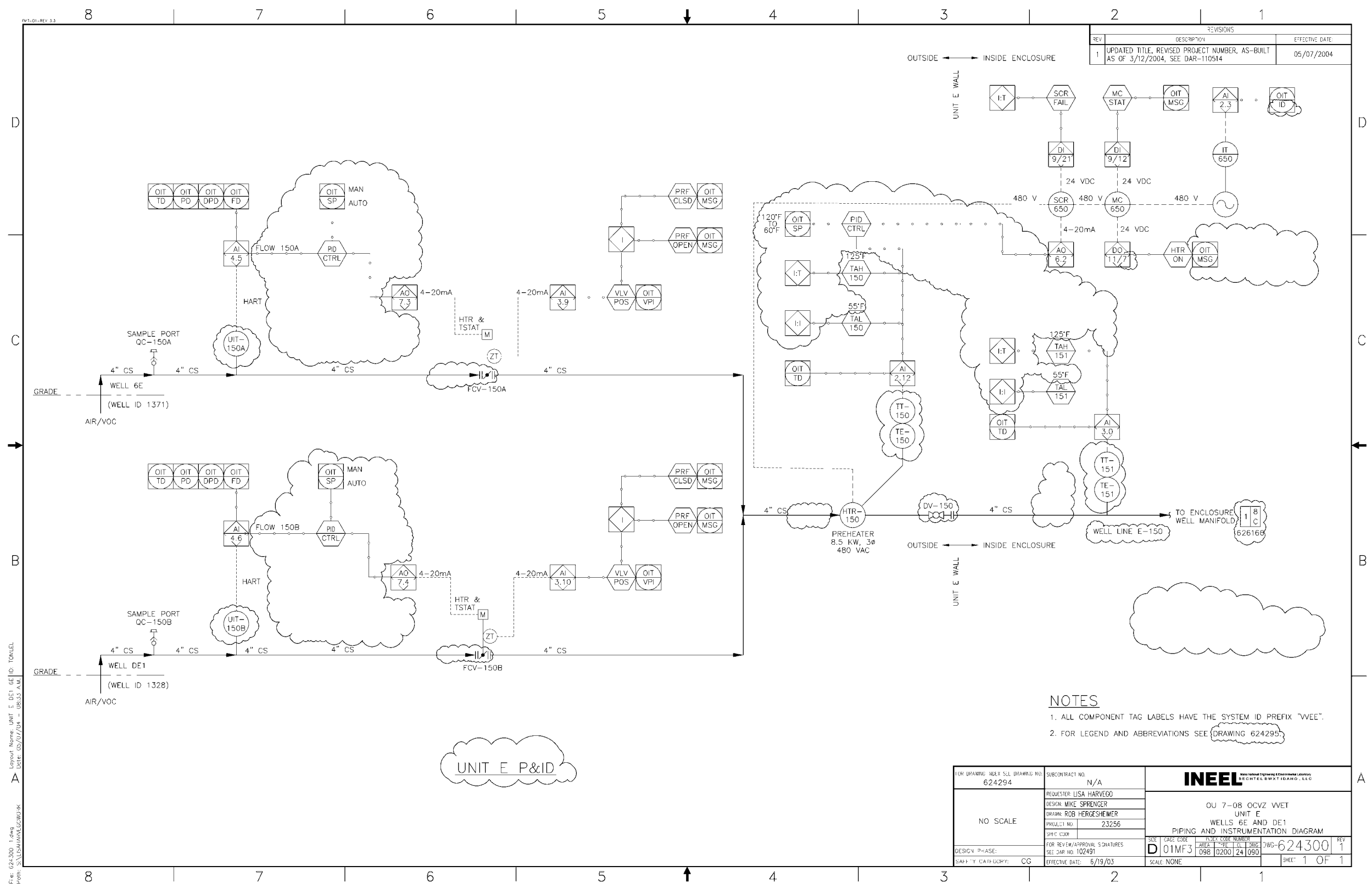

Figure A-8. OU 7-08 OCVZ VVET Unit E, Wells 6E and DE1 Piping and Instrumentation Diagram, Drawing No. 624300, Rev. 1.

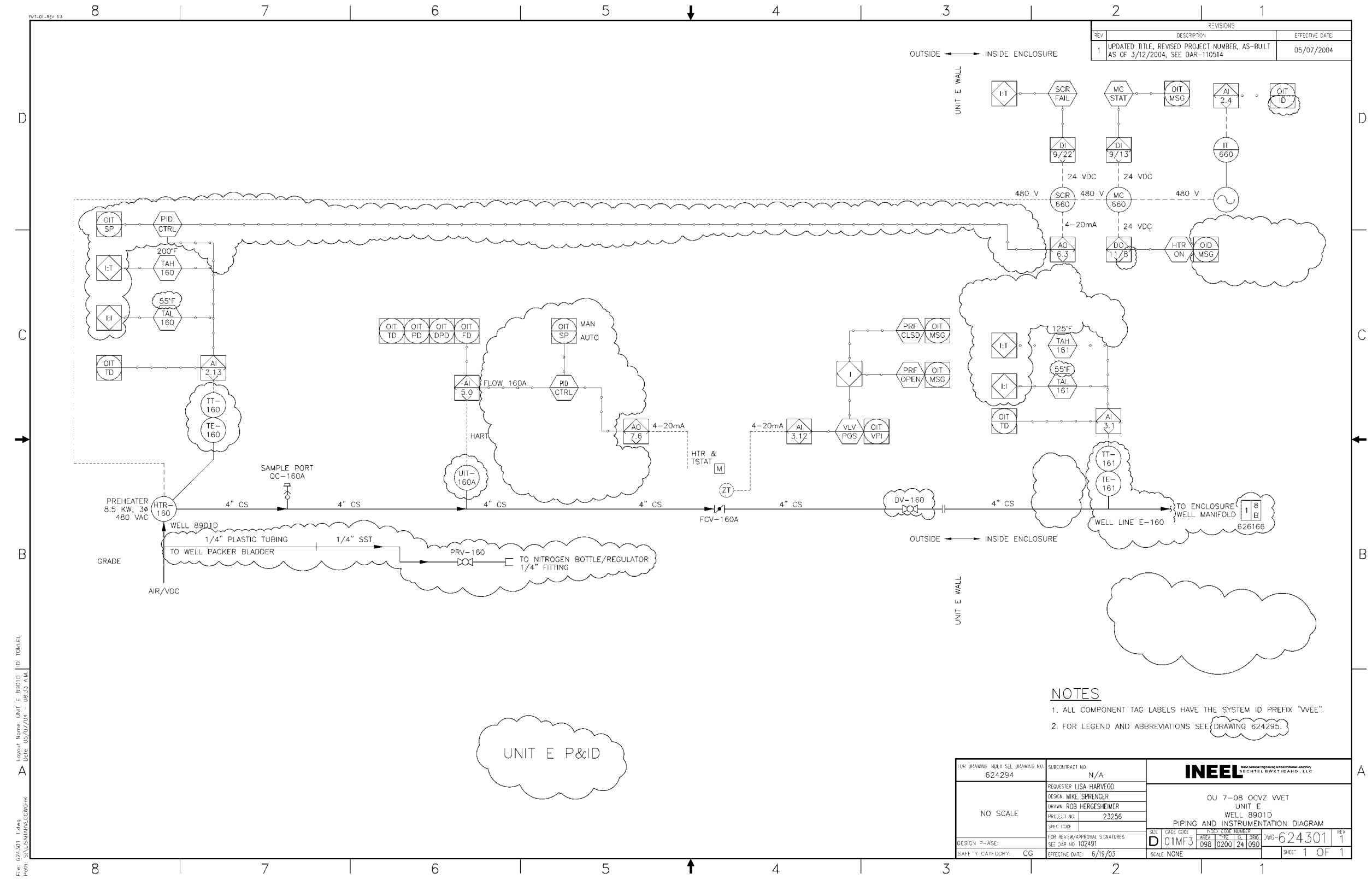

Figure A-9. OU 7-08 OCVZ VVET Unit E, Well 8901D Piping and Instrumentation Diagram, Drawing No. 624301, Rev. 1.

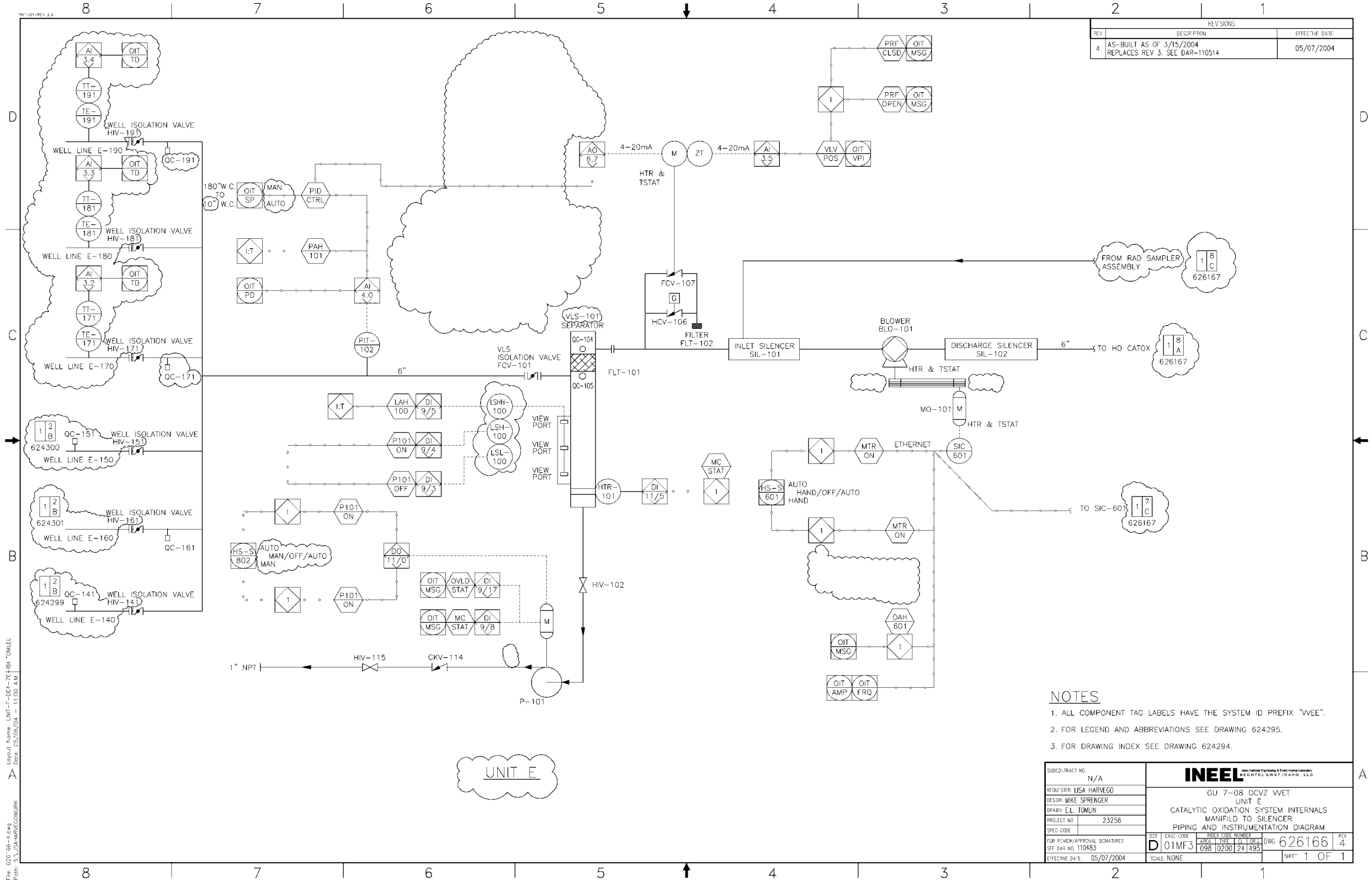

Figure A-10. OU 7-08 OCVZ VVET Unit E, Catalytic Oxidation System Internals, Manifold to Silencer, Piping and Instrumentation Diagram, Drawing No. 626166, Rev. 4.

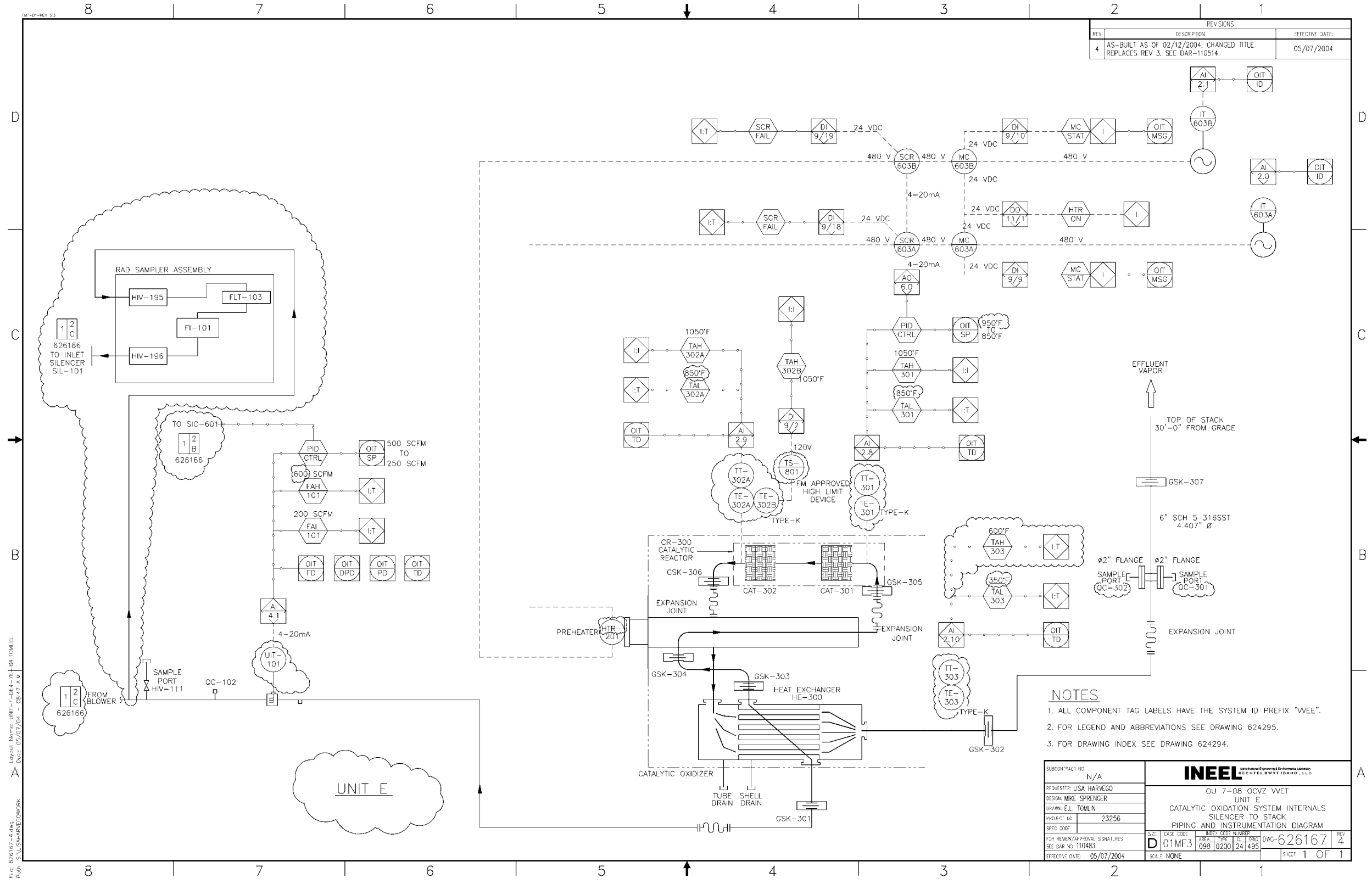

Figure A-11. OU 7-08 OCVZ VVET Unit E, Catalytic Oxidation System Internals, Silencer to Stack, Piping and Instrumentation Diagram, Drawing No. 626167, Rev. 4.

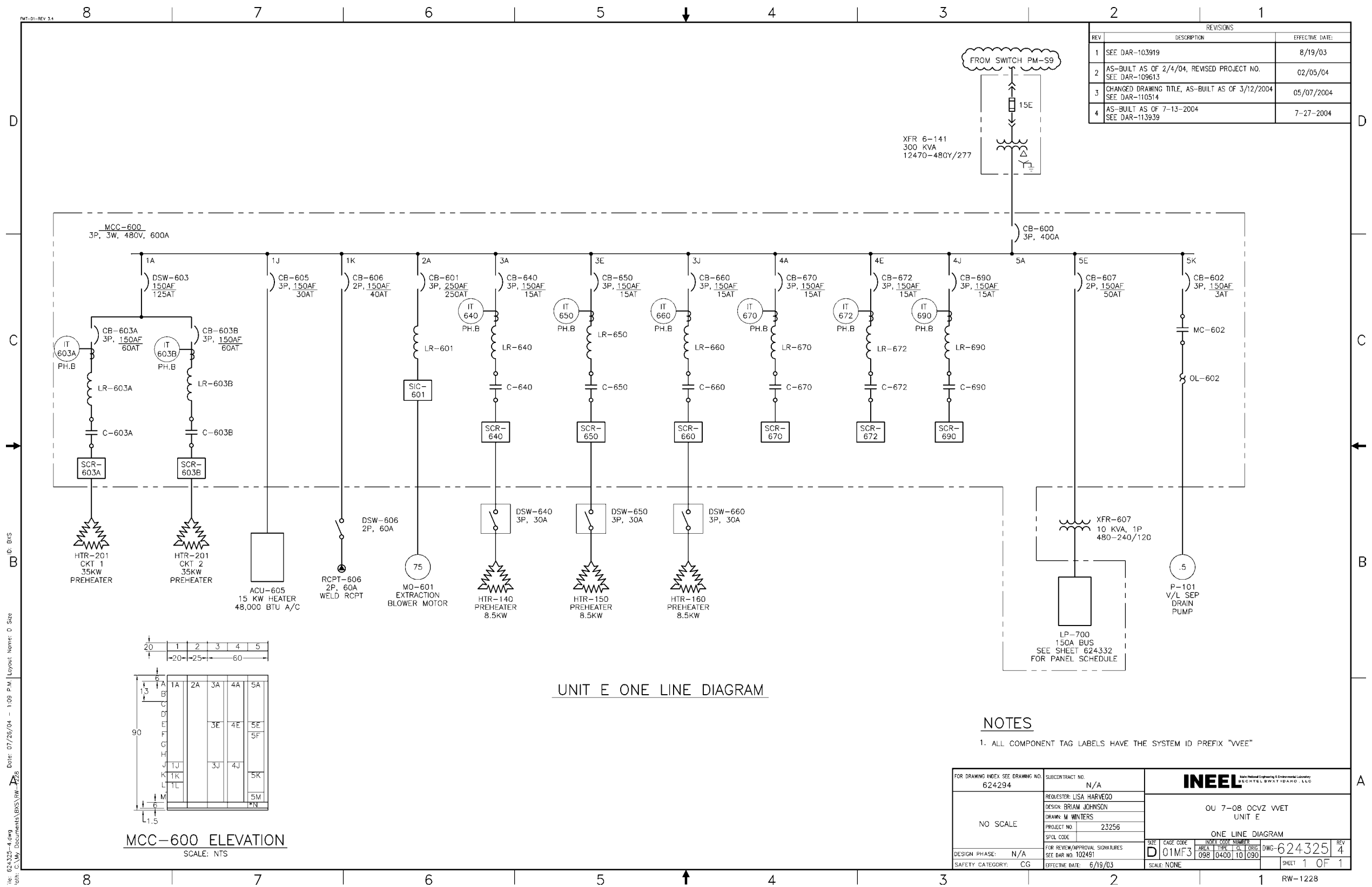

Figure A-12. OU 7-08 OCVZ VVET Unit E One Line Diagram, Drawing No. 624325, Rev. 4.

FMT-01-REV 3.4

REVISIONS		
REV	DESCRIPTION	EFFECTIVE DATE:
1	SEE DAR-103919	8/19/03
2	AS-BUILT AS OF 2/4/04, REVISED PROJECT NO. SEE DAR-109163	02/05/04
3	CHANGED DRAWING TITLE SEE DAR-110514	05/07/2004
4	AS-BUILT AS OF 6/23/04 SEE DAR-113299	6/28/04

PANEL LP-700 LOCATION VVEE-MCC-600

AMPS 150A MAIN 100A 1ø WIRE 3W Ø TYPE
VOLTAGE 240 FEED MOUNTING DIM.

BRANCH CIRCUIT	LINE	LOAD WATTS	AMP TRIP	CKT NO.	A B	CKT NO.	AMP TRIP	LOAD WATTS	LINE	BRANCH CIRCUIT
LT-801, INDOOR LIGHTING		440	15	1		2	15	210		LT-802, OUTDOOR LIGHTING
UT-801 & 802, GFCI OUTLETS		1800	15	3		4	15	1000		CP-800, CONTROL POWER
LP-740		1470	20	5		6	20	1470		LP-750
SPARE			15	7		8	20	1200		RCPT-760
SPARE			15	9		10	15	90		FCV-160A
SPARE			15	11		12				SPACE
SPARE			15	13		14				SPACE
SPARE			15	15		16	100			MAIN BREAKER
SPACE				17		18	100			MAIN BREAKER

TOTAL LOAD/LINE-WATTS A 3680 B 4000 FED FROM XFR 6-141
AMPS/LINE A 30.7 B 33.3
WIRE SIZE #8 CONDUIT SIZE 3/4"
SHORT CIRCUIT
INTERRUPTING CAPACITY 10,000

SEE NOTE 1

PANEL LP-740 LOCATION UNIT E

AMPS 40A MAIN N/A 1ø WIRE 2W Ø TYPE
VOLTAGE 120 FEED MOUNTING DIM.

BRANCH CIRCUIT	LINE	LOAD WATTS	AMP TRIP	CKT NO.	A B	CKT NO.	AMP TRIP	LOAD WATTS	LINE	BRANCH CIRCUIT
RCPT-740		1200	15	1		2	15	90		FCV-140A
SPARE			15	3		4	15			SPARE
FCV-140B		90	15	5		6	15	90		FCV-140C
SPACE				7		8				SPACE

TOTAL LOAD/LINE-WATTS A 1470 FED FROM LP-700 CKT, 5
AMPS/LINE A 12.25
WIRE SIZE #6 CONDUIT SIZE 3/4"
SHORT CIRCUIT
INTERRUPTING CAPACITY 10,000

PANEL LP-750 LOCATION UNIT E

AMPS 40A MAIN N/A 1ø WIRE 2W Ø TYPE
VOLTAGE 120 FEED MOUNTING DIM.

BRANCH CIRCUIT	LINE	LOAD WATTS	AMP TRIP	CKT NO.	A B	CKT NO.	AMP TRIP	LOAD WATTS	LINE	BRANCH CIRCUIT
RCPT-750		1200	15	1		2	15	90		FCV-150A
SPARE			15	3		4	15			SPARE
FCV-150B		90	15	5		6	15			SPARE
SPACE				7		8				SPACE

TOTAL LOAD/LINE-WATTS A 1380 FED FROM LP-700 CKT, 6
AMPS/LINE A 11.5
WIRE SIZE #6 CONDUIT SIZE 3/4"
SHORT CIRCUIT
INTERRUPTING CAPACITY 10,000

UNIT E PANEL SCHEDULES

NOTES

1. ALL COMPONENT TAG LABELS HAVE THE SYSTEM ID PREFIX "VVEE"

FOR DRAWING INDEX SEE DRAWING NO. 624294	SUBCONTRACT NO. N/A	INEEL Idaho National Engineering & Environmental Laboratory BECHTEL BWXT IDAHO, LLC
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RW-1223

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Figure A-13. OU 7-08 OCVZ VVET Unit E Panel Schedules, Drawing No. 624332, Rev. 4.

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VVET Unit F

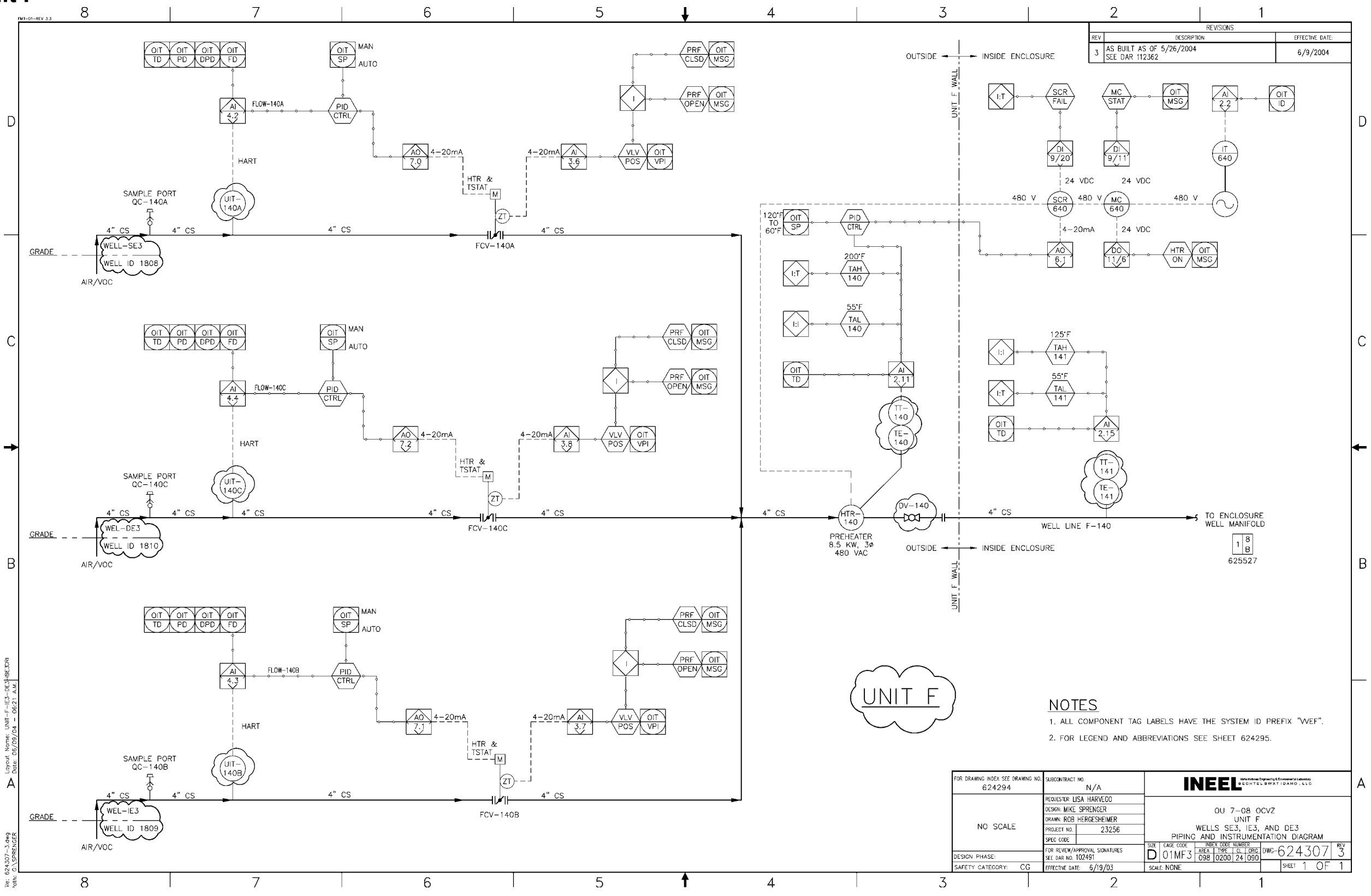

Figure A-14. OU 7-08 OCVZ Unit F, Wells SE3, IE3, and DE3 Piping and Instrumentation Diagram, Drawing No. 624307, Rev. 3.

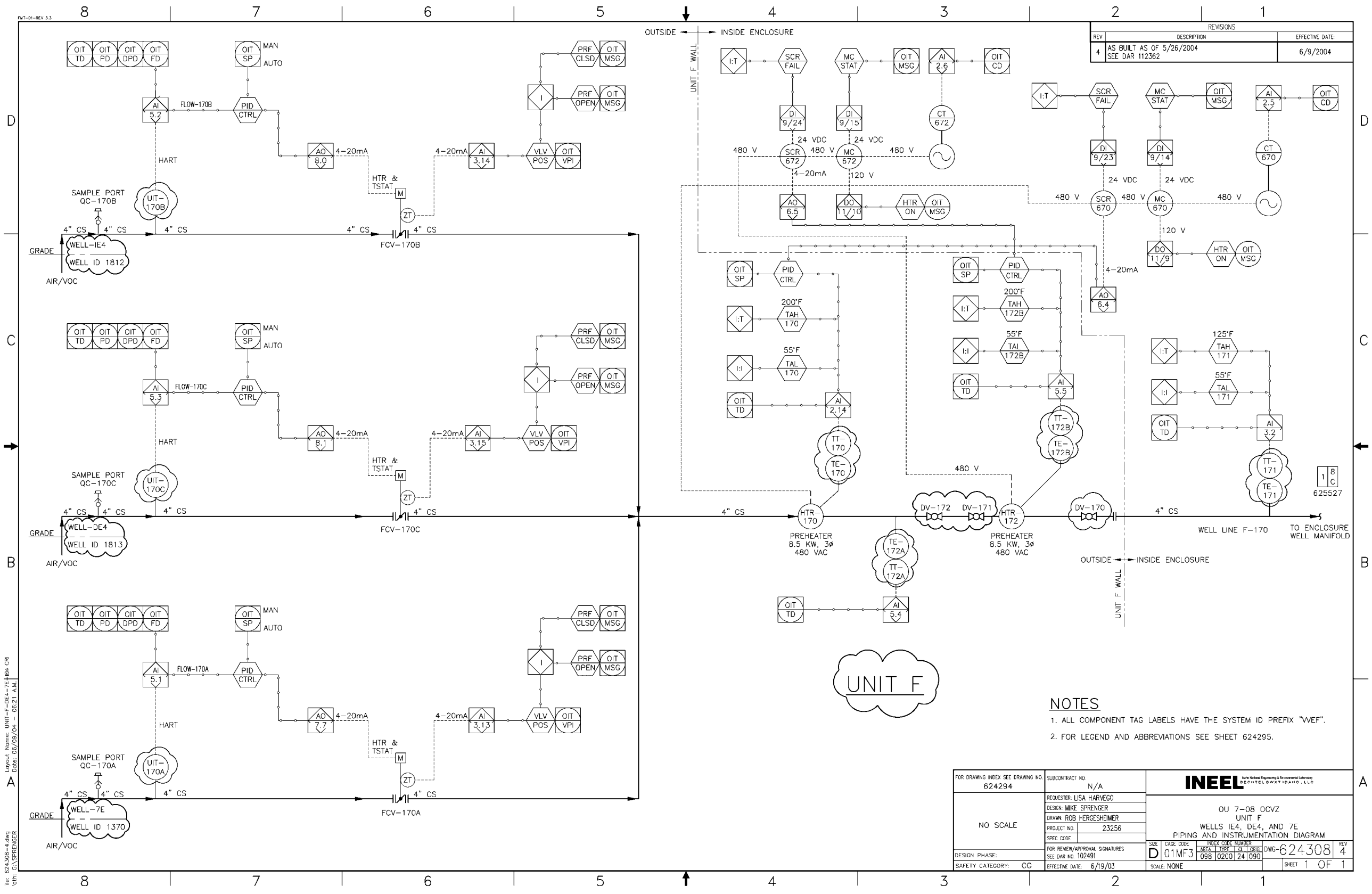

Figure A-15. OU 7-08 OCVZ Unit F, Wells IE4, DE4, and 7E Piping and Instrumentation Diagram, Drawing No. 624308, Rev. 4.

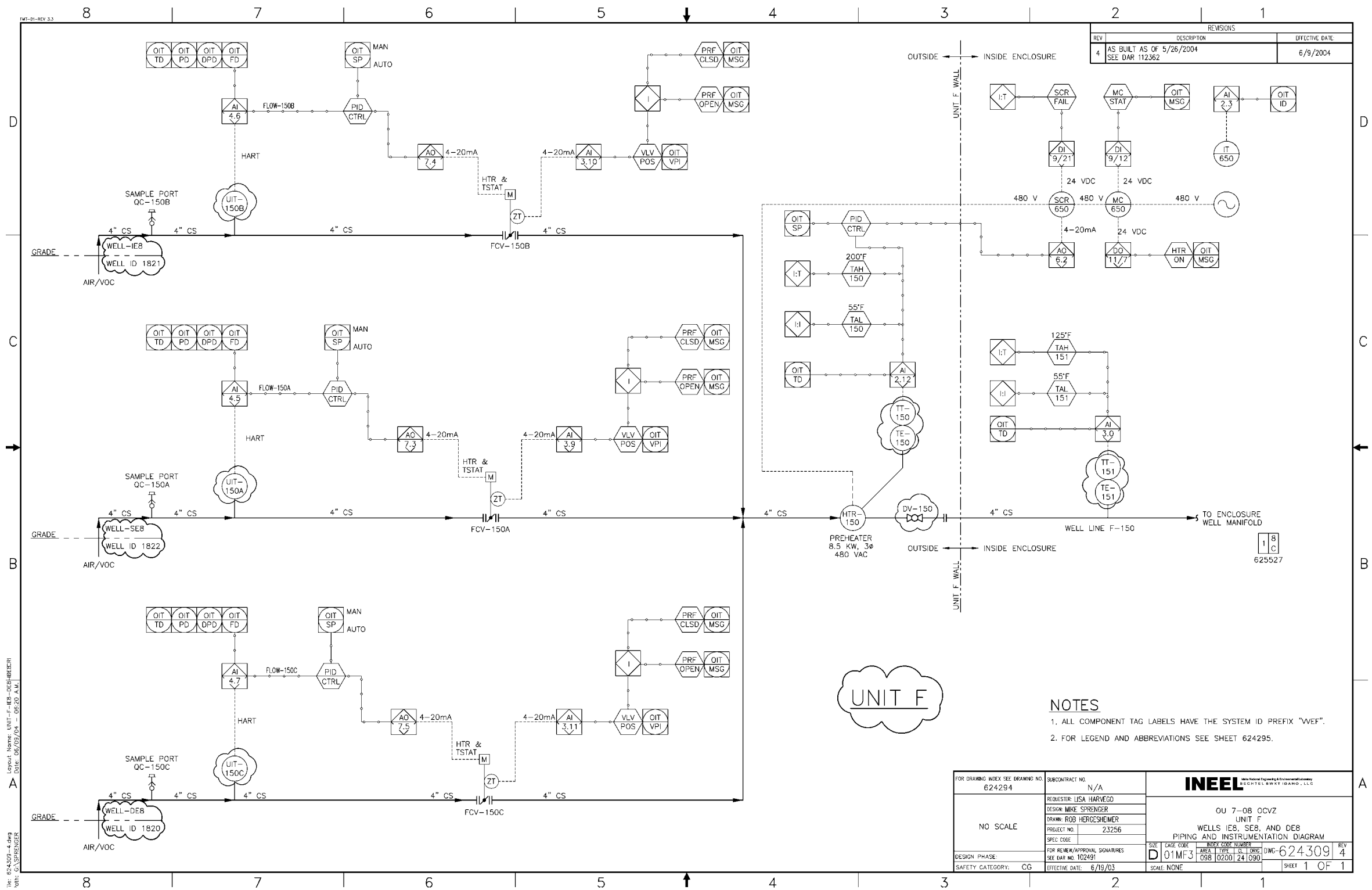

Figure A-16. OU 7-08 OCVZ Unit F, Wells IE8, SE8, and DE8 Piping and Instrumentation Diagram, Drawing No. 624309, Rev. 3.

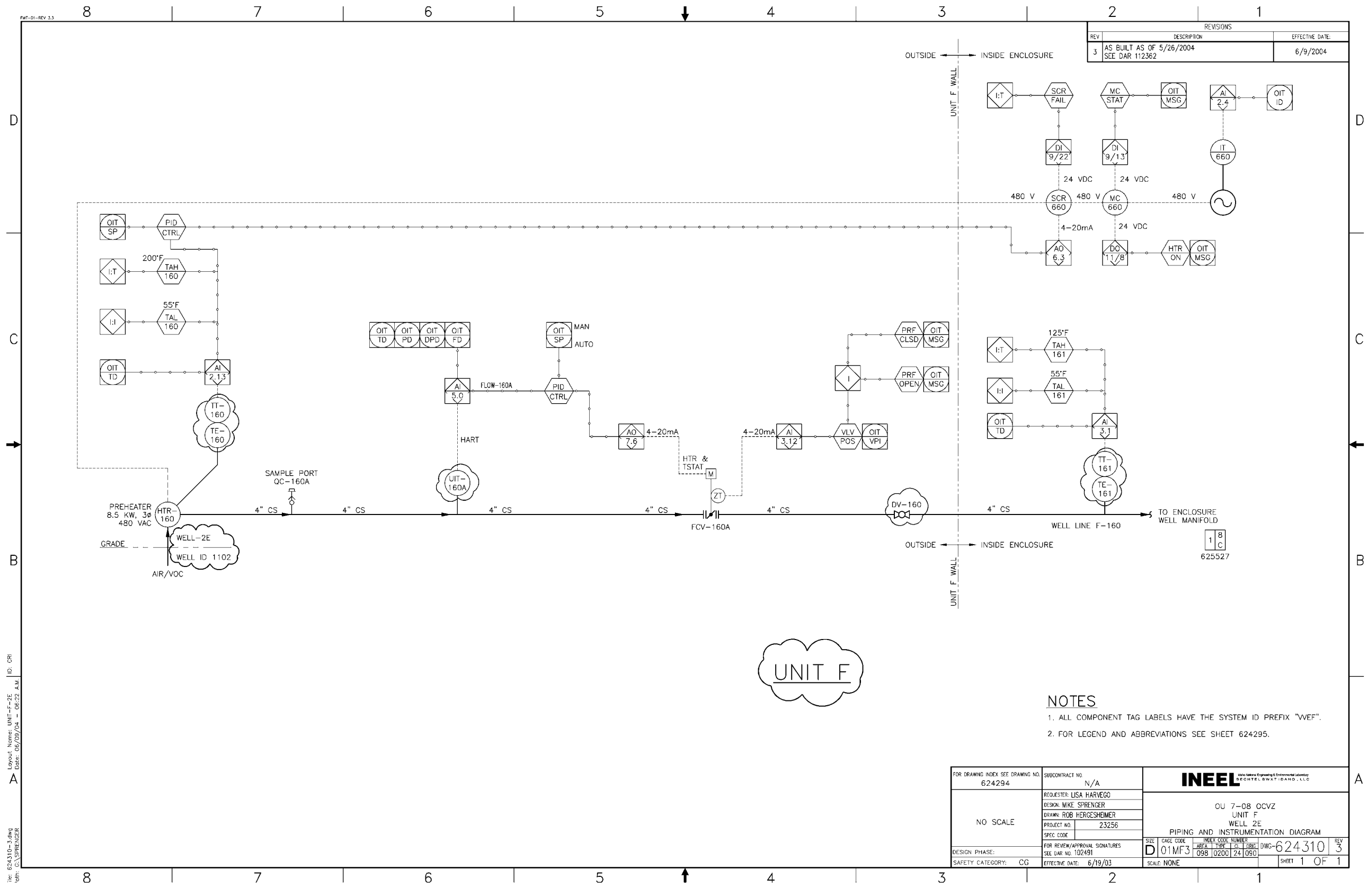

Figure A-17. OU 7-08 OCVZ Unit F, Well 2E Piping and Instrumentation Diagram, Drawing No. 624310, Rev. 3.

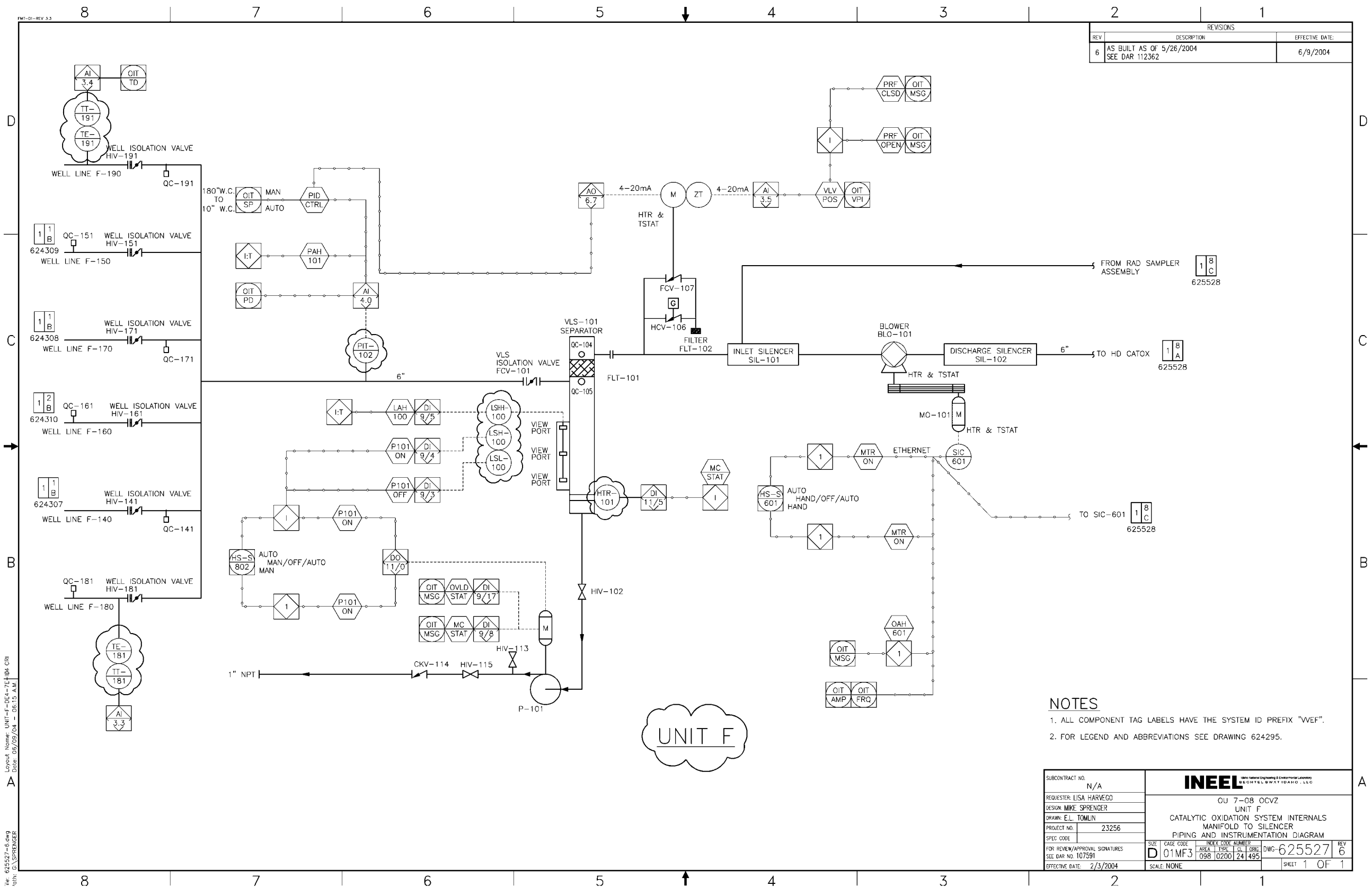

Figure A-18. OU 7-08 OCVZ Unit F, Catalytic Oxidation System Internals Manifold to Silencer Piping and Instrumentation Diagram, Drawing No. 625527, Rev. 6.

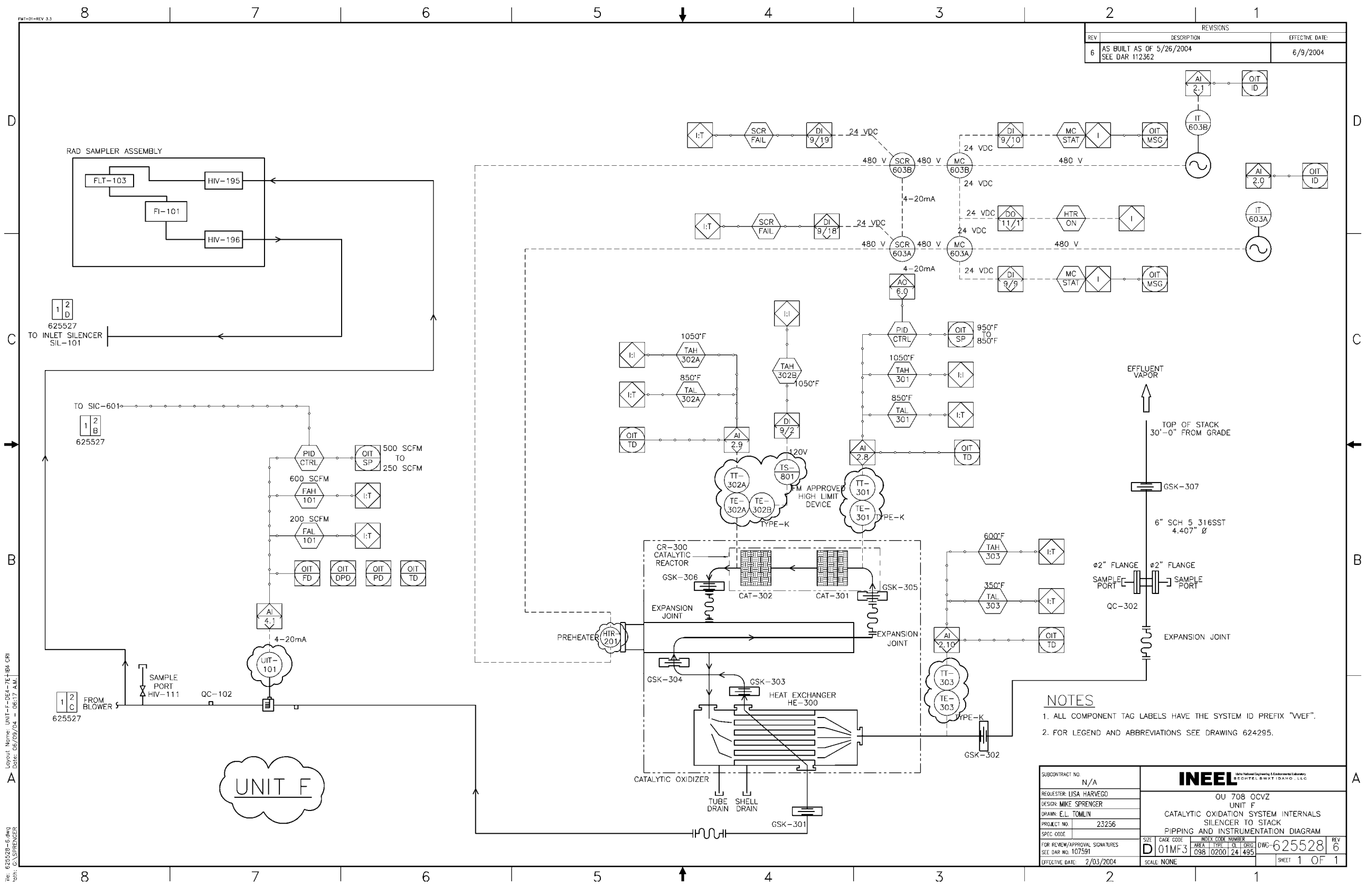

Figure A-19. OU 7-08 OCVZ Unit F, Catalytic Oxidation System Internals Silencer to Stack Piping and Instrumentation Diagram, Drawing No. 625528, Rev. 6.

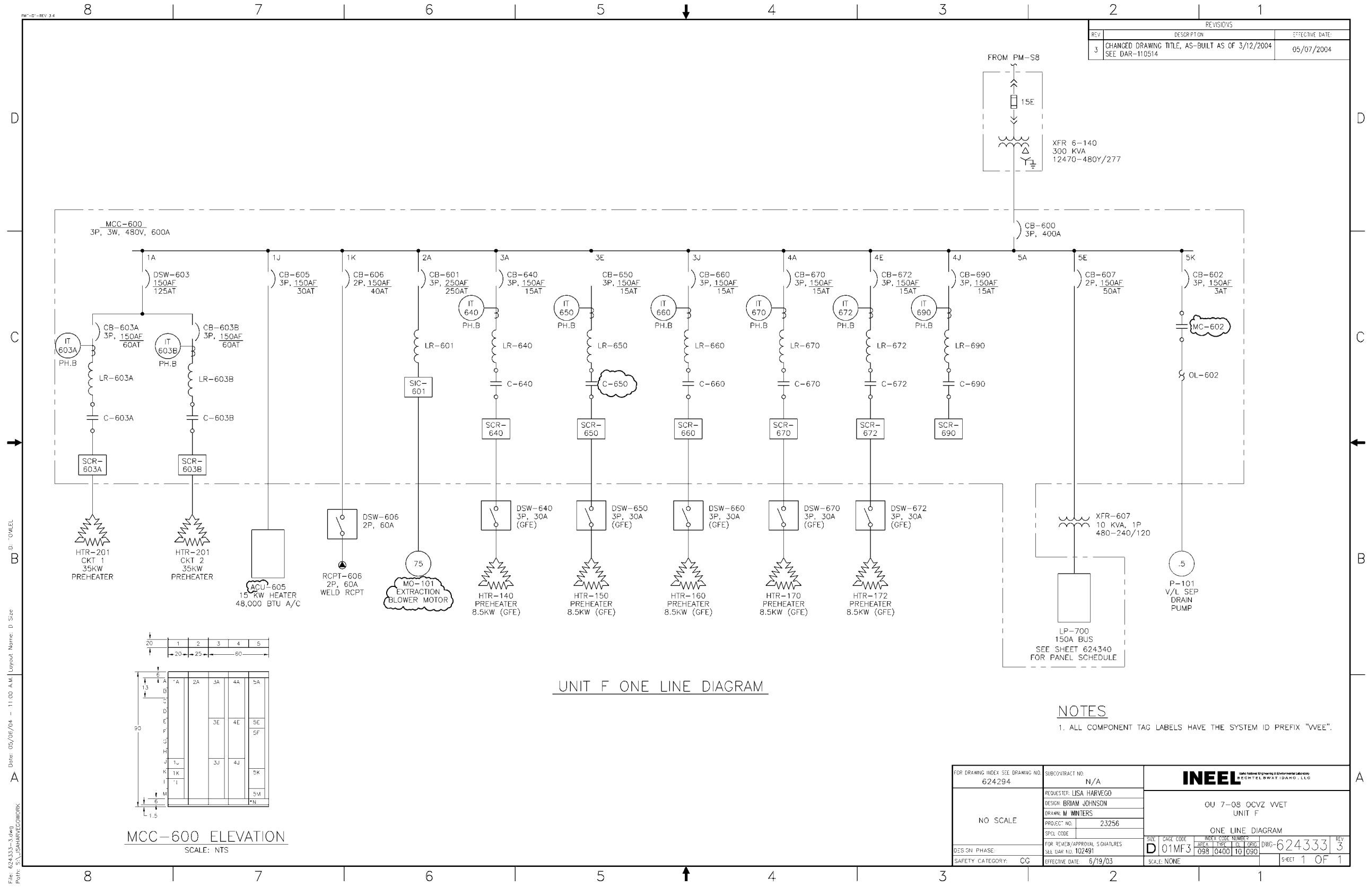

Figure A-20. OU 7-08 OCVZ VVET Unit F One Line Diagram, Drawing No. 624333, Rev. 3.

REVISIONS		
REV.	DESCRIPTION	EFFECTIVE DATE:
1	SEE DAR-103919	8/19/03
2	AS-BUILT AS OF 1/23/04 SEE DAR-108913	02/03/2004
3	CHANGED DRAWING TITLE, AS BUILT AS OF 3/12/2004 SEE DAR-110514	05/07/2004

PANEL LP-700 LOCATION VVEF-MCC-600

AMPS 50A MAIN 100A 1ø WIRE 3W ø TYPE
VOLTAGE 240 FEED MOUNTING SURFACE DIM.

BRANCH CIRCUIT	LINE	LOAD WATTS	AMP TRIP	CKT NO.	A B	CKT NO.	AMP TRIP	LOAD WATTS	LINE	BRANCH CIRCUIT
LT-801, INDOOR LIGHTING		440	15	1		2	15	210		LT-802, OUTDOOR LIGHTING
LT-801 & 802, GFCI OUTLETS		1800	15	3		4	15	1000		CP-800, CONTROL POWER
LP-740		1470	20	5		6	20	1470		LP-750
RCPT-760		1200	15	7		8	20	1470		LP-770
FCV-160A		90	15	9		10	15			SPARE
SPARE			15	11		12	15			SPARE
SPACE				13		14				SPACE
SPACE				15		16	100			MAIN BREAKER
SPACE				17		18	100			MAIN BREAKER

TOTAL LOAD/LINE-WATTS A 3680 B 5470 FED FROM XFR 6-140
AMPS/LINE A 30.7 B 46
WIRE SIZE #8 CONDUIT SIZE 3/4"
SHORT CIRCUIT
INTERRUPTING CAPACITY 10,000

SEE NOTE 1

PANEL LP-740 LOCATION UNIT F

AMPS 40A MAIN N/A 1ø WIRE 2W ø TYPE
VOLTAGE 120 FEED MOUNTING SURFACE DIM.

BRANCH CIRCUIT	LINE	LOAD WATTS	AMP TRIP	CKT NO.	A B	CKT NO.	AMP TRIP	LOAD WATTS	LINE	BRANCH CIRCUIT
RCPT-740		1200	15	1		2	15	90		FCV-140A
SPARE			15	3		4	15			SPARE
FCV-140B		90	15	5		6	15	90		FCV-140C
SPACE				7		8				SPACE

TOTAL LOAD/LINE-WATTS A 1470 FED FROM LP-700 CKT, 5
AMPS/LINE A 12.25
WIRE SIZE #2 CONDUIT SIZE 1"
SHORT CIRCUIT
INTERRUPTING CAPACITY 10,000

PANEL LP-750 LOCATION UNIT F

AMPS 40A MAIN N/A 1ø WIRE 2W ø TYPE
VOLTAGE 120 FEED MOUNTING SURFACE DIM.

BRANCH CIRCUIT	LINE	LOAD WATTS	AMP TRIP	CKT NO.	A B	CKT NO.	AMP TRIP	LOAD WATTS	LINE	BRANCH CIRCUIT
RCPT-750		1200	15	1		2	15	90		FCV-150A
SPARE			15	3		4	15			SPARE
FCV-150B		90	15	5		6	15	90		FCV-150C
SPACE				7		8				SPACE

TOTAL LOAD/LINE-WATTS A 1470 FED FROM LP-700 CKT, 6
AMPS/LINE A 12.25
WIRE SIZE #10 CONDUIT SIZE 3/4"
SHORT CIRCUIT
INTERRUPTING CAPACITY 10,000

PANEL LP-770 LOCATION UNIT F

AMPS 40A MAIN N/A 1ø WIRE 2W ø TYPE
VOLTAGE 120 FEED MOUNTING SURFACE DIM.

BRANCH CIRCUIT	LINE	LOAD WATTS	AMP TRIP	CKT NO.	A B	CKT NO.	AMP TRIP	LOAD WATTS	LINE	BRANCH CIRCUIT
RCPT-770		1200	15	1		2	15	90		FCV-170A
SPARE			15	3		4	15			SPARE
FCV-170B		90	15	5		6	15	90		FCV-170C
SPACE				7		8				SPACE

TOTAL LOAD/LINE-WATTS A 1470 FED FROM LP-700 CKT, 8
AMPS/LINE A 12.25
WIRE SIZE #1 CONDUIT SIZE ARMORED CABLE
SHORT CIRCUIT
INTERRUPTING CAPACITY 10,000

UNIT F PANEL SCHEDULES

NOTES

1. ALL COMPONENT TAG LABELS HAVE THE SYSTEM ID PREFIX "VVEF".

FOR DRAWING INDEX SEE DRAWING NO. 624294	SUBCONTRACT NO. N/A	INEEL Idaho National Engineering & Environmental Laboratory BECHTEL BWXT IDAHO, LLC
NO SCALE	REQUESTER: LISA HARVEGO DESIGN: BRIAN JOHNSON DRAWN: M WINTERS PROJECT NO. 23256 SPCL CODE	OU 7-08 OCVZ VVET UNIT F PANEL SCHEDULES
DESIGN PHASE:	FOR REVIEW/APPROVAL SIGNATURES SEE DAR NO. 102491	SIZE D · CAGE CODE 01MF3 · INDEX CODE NUMBERS AREA 098 · TYPE 0400 · SYS 10 · SEQ 090 · DWG-624340 · REV 3
SAFETY CATEGORY: CG	EFFECTIVE DATE: 5/19/03	SCALE: NONE · SHEET 1 OF 1

File: 624340-3.dwg Path: S:_RANA\01\GWORK Layout Name: D Size Date: 05/07/04 - 08:44 AM ID: TOMLEL

Figure A-21. OU 7-08 OCVZ VVET Unit F Panel Schedules, Drawing No. 624340, Rev. 3.

Appendix B

Technical Procedures and Logbook Sheets

Appendix B

Technical Procedures and Logbook Sheets

Catalytic oxidation system warning and shutdown alarms for Vapor Vacuum Extraction with Treatment (VVET) Unit D are detailed in Technical Procedure (TPR) -1662, "VVET Catalytic Oxidizer Startup, Operations, and Shutdown." Alarms for VVET Units E and F are detailed in TPR-1634, "VVET Units E and F Catalytic Oxidizer Startup, Operation, and Shutdown." Testing is performed at the Subsurface Disposal Area with the catalytic oxidizers in full-scale operation in accordance with TRP-6859, "Performance Testing of Organic Contamination in the Vadose Zone Vapor Vacuum Extraction with Treatment Systems." Copies of these TPRs are included in this appendix

Copies of the operations logbook sheets for VVET Units D, E, and F are also included in this appendix.

STANDARD OPERATING PROCEDURE

VVET CATALYTIC OXIDIZER UNIT D STARTUP, OPERATION, AND SHUTDOWN

Facility/System: VVET Catalytic Oxidizer Unit D

REVIEWERS	Required (X)
RWMC Radiological Engineer	X
RWMC Rigging Engineer	
RWMC Industrial Safety Engineer	X
RWMC Quality Engineer	X
RWMC Industrial Hygienist	X
RWMC Environmental Engineer	X
RWMC Fire Protection Engineer	X
RWMC Criticality Engineer	
RWMC System Engineer	X
RWMC Operations	X
Other	

CONTENTS

TABLES

1. INTRODUCTION

1.1 Purpose

The vapor vacuum extraction with treatment (VVET) catalytic oxidation unit is operated as part of environmental actions for Operable Unit 7-08, Organic Contamination in the Vadose Zone (OCVZ) at the Radioactive Waste Management Complex (RWMC).

1.2 Scope and Applicability

This procedure directs the startup, routine operation, response to alarms, and shutdown of the VVET catalytic oxidation Unit D. Both normal and emergency shutdowns are covered. This procedure applies to all personnel who operate VVET Unit D.

2. PRECAUTIONS AND LIMITATIONS

NOTE: 1 *Unit D is equipped with a programmable logic controller (PLC). One of the PLC's functions is to ensure the oxidizer stays within acceptable operating conditions.*

NOTE 2: *The PLC will automatically shut down the oxidizer if it moves outside the acceptable conditions. Table 4 provides the limits of acceptable operating conditions.*

2.1 Key Unit D operating parameters with corresponding limiting and design values are given in Table 1.

Table 1. Unit D limiting and design values for normal operations.

Operating Parameter	Minimum	Maximum	Design
Well Exit Temperature	55°F	200°F	60-120°F
Catalyst Inlet Temperature	850°F	1050°F	850-950°F
Catalyst Outlet Temperature	850°F	1050°F	850-950°F
Process vapor/Ambient Air Flow	200 scfm	600 scfm	250-550 scfm
Wellhead Pressure	0 in. wc	195 in. wc (vac)	10-180 in. wc (vac)

2.2 Operating VVET units outside normal and acceptable operating conditions could result in poor efficiency with respect to destruction of organic contaminants in the process vapor or damage to the oxidizer unit and its components.

2.3 All personnel performing steps in this procedure must meet RWMC access training requirements.

(JSA)

2.4 Only VVET technicians listed on the RWMC Qualified Watch Standers List are authorized to perform the actions described in this procedure. The only exceptions to this requirement are:

- Personnel who are involved in on-shift training and who are under the direct and immediate supervision of an authorized VVET technician
- OCVZ technical support staff who are supporting an authorized VVET technician under Step 2.9
- Analyst receiving samples and returning empty sample bags.

2.5 Entry into the Unit D fenced area requires compliance with INEL/EXT-03-00467, *Health and Safety Plan (HASP)*.

(JSA)

2.6 Enclosure doors must be secured from striking personnel during windy weather.

(JSA)

2.7 Barriers must be in place inside of cabinet (CP-800) to prevent personnel exposure to electrical voltages in excess of 50 vac when doors are opened.

(JSA)

2.8 Repairs, troubleshooting, and corrective maintenance requiring craft work must be done per Standard (STD)-101, *Integrated Work Control Process*. However, VVET technicians are allowed to perform limited troubleshooting and adjustments/problem resolution following approval from the System Engineer (SE) or designated alternate.

2.9 Prior to leaving Unit D operating and unmanned between noncontiguous shifts, the VVET technician must ensure the unit is in run mode or in safe shutdown mode, and is operating in a safe and stable manner.

2.10 Caution must be used when moving around equipment to avoid being caught between objects/machinery.

(JSA)

2.11 Caution must be used to avoid hot surfaces on equipment/lines.

(JSA)

2.12 Body position awareness must be used to avoid injury from bumping into protruding objects or tripping hazards.

(JSA)

2.13 Minimum personal protective equipment (PPE) for access into OCVZ Unit D is safety-toe footwear, safety glasses with side shield, and a hard hat.

(JSA)

3. PREREQUISITES

3.1 IF Unit D has undergone significant (as determined by the SE or Project Engineer [PE]) repairs or modifications,
THEN, prior to resuming normal operations, testing to demonstrate compliance with design and/or operating requirements has been performed per Management Control Procedure (MCP)-3056, *Test Control*.

3.2 The VVET technician must have access to two-way wireless communication (that is, radio or cellular telephone), capable of contact with the RWMC Shift Supervisor (SS) while performing the activities outlined in this procedure.

(JSA)

3.3 IF a VVET technician is not present at RWMC for seven or more consecutive calendar days,
THEN the technician has reviewed entries in the Unit D Narrative Logbook (hereinafter "Logbook") for the days the technician was away from RWMC AND documented the review in the Logbook.

3.4 The SE, PE, or designee has documented the desired setpoints for well line D-150 (well 7V) manifold temperature TE-151, well line D-170 (wells SE-6, IE-6, and DE-6) manifold temperature TE-171, vapor liquid separator pressure transmitter PIT-102, and total system flow rate FT-101 in the Logbook.

3.5 A pre-job brief has been performed in accordance with MCP-3003, *Performing Pre-job Briefings and Documenting Feedback*, that covers, but is not limited to, the following:

A. HASP

B. Potential hazards and hazard controls associated with entering the Unit D fenced area, working within the enclosure, and with specific job steps (RWMC JSA-6572).

3.6 Tedlar® sample bags are staged.

3.7 The areas outside and inside the enclosure, have been walked down and general conditions and the following specific items have been observed:

(JSA)

A. Placement and condition of fencing and postings

B. Housekeeping

C. Major equipment configuration (must be interconnected as shown on the P&IDs) and condition

D. Lockout/tagouts (none are expected)

E. Placement and condition of machine guarding

F. Placement and condition of electrical covers

G. Water level in vapor liquid (V/L) separator (must be below middle view port)

H. Positions of well isolation valve FCV-101 (must be fully closed) and ambient air intake valve FCV-107 (must be fully open)

I. Placement and condition of the two fire extinguishers.

NOTE: *The technician has consulted with the OFTL or SE to determine the desired position of a component whose desired position is weather-dependent (for example, a unit enclosure heater circuit breaker).*

3.8 IF directed by the OFTL or SE,
THEN the components listed in Part A and/or B of Appendix B are positioned
OR the components are already in the desired position.

WARNING

CP-800 contains 120 volt (V) conductors that could present an electrocution hazard.

3.9 The transparent cover that prevents contact with exposed conductors is in place.

(JSA)

3.10 IF directed by the OFTL or SE, to verify the positions of the components in PP-811,
THEN an electrician has positioned the components listed in Part C of Appendix B under STD-101 work controls.

3.11 IF the emergency shutdown (ESD) button was in the pushed-in position
AND the reason the ESD button was in the pushed-in position has been resolved,
THEN the ESD button has been placed in the pulled-out position.

3.12 To ensure power is supplied to the unit, it has been verified that at least some lamps on PP-600 are illuminated.

3.13 The LAMP TEST button on the Operator Interface Terminal (OIT) has been pressed and released to ensure all bulbs on PP-600 are illuminated.

NOTE: *The technician may proceed with Step 3.14 if LMP-860, LMP-870, and/or LMP-880 failed to illuminate during completion of Step 3.13 (since the indicator lights are associated with equipment to be added in the future).*

3.14 IF the OIT indicated any alarms,
THEN all alarm conditions have been corrected
AND all alarms have been cleared by acknowledging each alarm individually.

3.15 The hand-off-auto (HOA) and OFF-ON switches specified in Table 2 have been placed in the desired positions.

Table 2. Desired positions of HOA and OFF-ON switches for unit startup.

Switch Number	Switch Association	Desired Position
HS-801	BLO-101 Extraction Blower	AUTO
HS-802	P-101 V/L Separator Drain Pump	OFF
HS-803	FCV-101 Well Isolation Valve	AUTO
HS-804	FCV-107 Auto Ambient Air Valve	AUTO
HS-805	P-102 Liquid Injection Pump	OFF
HS-850	Well HTR-150 (Well 7V)	ON
HS-860	Spare	OFF
HS-870	Well HTR-170 (Wells SE-6, IE-6, and DE-6)	ON
HS-880	Spare	OFF

3.16 The corresponding hand switch, HS-850 or HS-870, is in the correct position for the corresponding well line 150 or 170 position.

3.17 FCV-112 is approximately 50% open as indicated by the valve positioner shaft.

3.18 The setpoint of total system process flow rate FT-101 on the OIT is 350 cfm.

3.19 The setpoint of catalyst inlet temperature TE-301 on the OIT is 950°F.

3.20 The setpoint of catalyst outlet temperature TE-302A on the OIT is 975°F.

WARNING

Operation of the process vapor inlet manifold at a temperature higher than 125°F could result in personnel injury.

3.21 The setpoint of well line D-150 (well 7V) manifold temperature TE-151 and/or well line D-170 (wells SE-6, IE-6, and DE-6) manifold temperature TE-171 on the OIT is/are at the value(s) specified by the SE.

(JSA)

4. INSTRUCTIONS

4.1 General Instructions

NOTE 1: *The following instructions involve the identification of VVET catalytic oxidizer components with truncated alphanumeric designations (for example FCV-107, instead of VVED-FCV-107) for ease of use of this procedure. Designated components can be found in the Piping and Instrumentation Diagrams (P&IDs).*

NOTE 2: *This procedure covers the four operational modes of the catalytic oxidizer which are discussed in Appendix A.*

NOTE 3: *Unless otherwise directed or allowed by this procedure, the technician will exit this procedure if a step cannot be completed. The technician will then notify the Operations Field Team Leader (OFTL) or SE.*

4.1.1 Ensure all of the prerequisites have been met.

4.1.2 Notify SS and OFTL of changes in a unit's status, abnormalities, difficulties encountered while performing assigned tasks, or other unexpected events.

4.1.3 Notify the Radiological Control Technician (RCT) Foreman when the following occurs:

- Vapor extraction is interrupted for more than one shift
- A VVET unit is returned to routine, sustained operations.

(JSA)

4.1.4 **GO TO** the appropriate procedure section from the following table, based on the desired task to be performed,
THEN **RETURN TO** this step, unless otherwise directed.

NOTE: *The technician may proceed to Section 4.12 as soon as a warning or shutdown alarm is observed.*

Task	Section
VVET unit startup /pre-heat mode.	**GO TO** Section 4.2
VVET unit startup (run mode)	**GO TO** Section 4.3
VVET unit startup/select process wells.	**GO TO** Section 4.4
Perform routine surveillance and adjust parameters.	**GO TO** Section 0
Process inlet stream sampling and sample handling (inside enclosure).	**GO TO** Section 4.6
Process inlet stream sampling and sample handling (outside enclosure).	**GO TO** Section 4.7
Vapor liquid separator liquid manual pump out	**GO TO** Section 4.8
Respond to shutdown alarms.	**GO TO** Section 4.9
Perform normal shutdown.	**GO TO** Section 4.10
Perform emergency shutdown.	**GO TO** Section 4.11
Perform post shutdown activities.	**GO TO** Section 4.12

4.2 VVET Unit Startup/Preheat Mode

NOTE 1: *All steps must be performed by a qualified VVET technician unless specified otherwise.*

NOTE 2: *The following Unit startup steps may be performed from a remote location by a Qualified Technician. In addition to completion of these specific steps, the technician monitors the startup process and responds appropriately (for example, to shutdown alarms).*

4.2.1 Press and release the START button on the OIT.

NOTE: *The control system is programmed to affect the following actions:*

A. Blower outlet recirculation valve FCV-112 stays at or moves to about 50% open

B. Blower BLO-101 starts

C. Preheater HTR-201 is energized approximately 120 seconds after FT-101 reaches 200 scfm.

4.2.1.1 IF blower BLO-101 operates with unusual noise or vibration,
THEN IMMEDIATELY push and release the STOP button on the OIT, place the ESD button in the pushed-in position, or place HS-801 to OFF to shut down the blower
AND DO NOT proceed to the next step.

4.3 VVET Unit Startup/Run Mode

NOTE 1: *The system will automatically move into run mode when the conditions described in Appendix B for run mode are achieved. The control system is programmed to affect the following actions for run mode:*

A. Well isolation valve FCV-101 opens, as indicated by LMP-801 (illuminated) and LMP-805 (not illuminated), to allow flow of process vapor to the oxidizer

B. Well heater HTR-150 energizes, as indicated by LMP-850, for well line D-150, and/or well heater HTR-170 energizes, as indicated by LMP-870, for well line D-170, after well flow FT-150 and/or FT-170 reaches 60 cfm.

NOTE 2: *The control system will automatically shut down Unit D if the conditions described in Appendix B for run mode are not achieved within 2 hours of pushing the START button.*

NOTE 3: *At the discretion of the VVET technician, the position of FCV-106 may be adjusted at any time during completion of Section 4.3 to ensure a smooth transition from preheat mode to run mode.*

4.3.1 Using the OIT, adjust the setpoint of total system process flow rate FT-101 to a value between 250 to 550 scfm as documented by the SE in the Logbook (see Step 3.4).

4.3.2 Ensure total system process flow FT-101 stabilizes at the setpoint.

NOTE: *At the discretion of the VVET technician, the position of hand isolation valves HIV-151, 152, 171, 172, 173, 174, 175, 176, 177, 178, and 179 may be adjusted any time during completion of Section 4.3 to ensure a stable flow and/or vacuum control and a smooth transition from preheat mode to run mode.*

4.3.3 Ensure catalyst inlet temperature TE-301, and manifold temperature TE-151, if operating from well line D-150 (well 7V), and manifold temperature TE-171 if operating from well line D-170 (wells SE-6, IE-6, and DE-6), stabilize at their respective setpoints.

4.4 VVET Unit Startup/Select Process Wells

NOTE: *Well selection can be made utilizing one or more wells at the same time and in any combination (See Table 3).*

4.4.1 Have the SE, PE, or designee document the desired wells to be used for processing and the percent open in the Logbook.

4.4.2 For each well to be operated, verify corresponding valve(s) to be opened as shown in Table 3.

4.4.3 Operate valves to obtain desired flow rate.

Table 3. Well and valve identification

Well	Valves	Well	Valves
7V	HIV-150	DE-6	FCV-170B
SE-6	FCV-170A		HCV-170B
	HCV-170A		HIV-170
	HIV-170	IE-6	FCV-170C
			HCV-170C
			HIV-170

4.5 Routine Surveillance and Parameter Adjustment

NOTE 1: *Adjustments to the setpoints of total system process flow rate FT-101, well line D-150 (well 7V) manifold temperature TE-151, Catalyst Exit Temperature TE-302A, and/or well line D-170 (wells SE-6, IE-6, and DE-6) manifold temperature TE-171 may be made upon approval from the SE, PE, or designee (and documentation in the Logbook).*

NOTE 2: *Regularly scheduled shift is Monday through Thursday, 7:00 am to 5:30 pm.*

4.5.1 Complete routine surveillance tasks during each regularly-scheduled shift.

4.5.1.1 Complete equipment checks and monitor equipment conditions identified in the Logbook.

4.5.1.2 Record requested process data on the appropriate page provided in the Logbook.

4.5.2 IF appropriate as a result of completing Step 4.5.1 or of making an observation during an informal tour of the unit,
THEN adjust parameters per the appropriate steps in this procedure
AND record in the Logbook.

4.5.3 IF parameter adjustment is insufficient to resolve values or conditions found out-of-specification (if any),
THEN consult with the SE or OFTL
AND record in the Logbook.

4.6 Process Inlet Stream Sampling and Sample Handling (Inside Enclosure)

NOTE 1: *INEEL/EXT-99-00907, Field Sampling Plan for Operations and Monitoring Sampling Conducted in Support of the Organic Contamination in the Vadose Zone Remediation Project, does not require the use of chain-of-custody forms for VVET unit process inlet samples.*

NOTE 2: *Process samples inside the enclosure are taken during normal operations on scheduled work days. Samples may be taken any time as requested by the PE and/or Radiological Engineering.*

NOTE 3: *Smears/Swabs taken in this section during performance of Radiological surveys for Alpha, Beta/Gamma, and Trituium contamination will be counted in the laboratory following field activities.*

4.6.1 IF the Tedlar® sample bags are returned from the analytical laboratory not empty or not in usable condition,
THEN obtain empty, useable bags,
AND dispose of the unusable bags as cold waste.

NOTE: *The sample number consists of the unit designation, date, and time (for example, D062502@0730).*

4.6.2 WHEN ready to sample,
THEN write sample number on the bag label.

WARNING

Opening valve without sample bag attached could release volatile organic compounds (VOCs) into enclosure.

4.6.2.1 Attach the labeled sample bag to the flexible tube.

(JSA)

4.6.2.2 Open valve HIV-111 and the sample bag valve.

4.6.2.3 Fill the bag about 1/2 to 3/4 full.

4.6.2.4 Close the valves.

4.6.2.5 Remove the sample bag from the flexible tube and place the bags in secured storage.

4.6.2.6 Document the sampling evolution in the Logbook.

4.6.3 Prepare bags containing process vapor for transport to the analytical laboratory as directed by SE or OFTL.

4.6.3.1 RCT: Perform radiological surveys of fittings, outlet hose, and sample container(s).

4.6.3.2 Have the bags checked for free release by radiological control (RadCon) personnel.

(JSA)

4.6.3.3 IF the bags cannot be free released by RadCon personnel, THEN label and handle the bags as directed by RadCon personnel.

4.6.3.4 Place the bags in a sturdy protective container (for example, a rigid plastic box).

4.6.3.5 Ensure the box is labeled to describe the contents and to list at least two points-of-contact.

4.6.4 VVET Technician or Analyst: Transport bags to the laboratory for analysis.

4.6.4.1 Deliver the bags to the person who will perform the analysis.

4.7 Process Inlet Stream Sampling and Sample Handling (Outside Enclosure)

NOTE 1: *INEEL/EXT-99-00907, does not require the use of chain-of-custody forms for VVET unit process inlet samples.*

NOTE 2: *Process samples outside at the wells will be taken as requested by the PE and/or Radiological Engineering.*

NOTE 3: *Smears/Swabs taken in this section during performance of Radiological surveys for Alpha, Beta/Gamma, and Trituium contamination will be counted in the laboratory following field activities.*

4.7.1 IF the Tedlar® sample bags are returned from the analytical laboratory not empty or not in usable condition,
THEN obtain empty, useable bags,
AND dispose of the unusable bags as cold waste.

NOTE 1: *To avoid exposure to VOCs, personnel should avoid contact with the process vapor and position themselves upwind.*

NOTE 2: *The sample number consists of the well designation, date, and time (for example, SE6102503@0730).*

(JSA)

4.7.2 WHEN ready to sample,
THEN write sample number on the sample bag label.

NOTE: *The pump should be contained in a weather-resistant container during operation and should be protected by a ground fault circuit interrupter (GFCI).*

(JSA)

4.7.2.1 Hook up the power supply for the pump.

4.7.2.2 Attach the pump to the quick disconnect on the well line to be sampled.

4.7.2.3 Start pump.

4.7.2.4 Purge the line for approximately 5 seconds.

4.7.2.5 Attach the labeled sample bag to the flexible tube.

4.7.2.6 Fill the bag about 1/2 to 3/4 full.

4.7.2.7 Turn the pump OFF.

4.7.2.8 Remove the sample bag from the flexible tube

4.7.2.9 Place the bags in secured storage.

4.7.2.10 Disconnect power supply to the pump.

4.7.2.11 Document the sampling evolution in the Logbook.

4.7.3 Prepare bags containing process vapor for transport to the analytical laboratory directed by the SE or OFTL.

4.7.3.1 RCT: Perform radiological surveys of fittings, outlet hose, and sample container(s).

4.7.3.2 Have the bags checked for free release by RadCon personnel.

(JSA)

4.7.3.3 IF the bags cannot be free released by RadCon personnel, THEN label and handle the bags as directed by RadCon personnel.

4.7.3.4 Place the bags in a sturdy protective container (for example, a rigid plastic box).

4.7.3.5 Ensure the box is labeled to describe the contents and to list at least two points-of-contact.

4.7.4 VVET Technician or Analyst: Transport bags to the laboratory for analysis.

4.7.4.1 Deliver the bags to the person who will perform the analysis.

4.8 Vapor Liquid Separator Liquid Manual Pump Out

WARNING

Liquid from the V/L separator may contain radioactive and/or chemical contamination. Directions on the applicable Radiological Work Permit must be followed during completion of the V/L separator liquid manual pump out.

4.8.1 Wear nitrile gloves and safety glasses when coming in contact with liquid from the V/L separator.

(JSA)

4.8.2 Connect the outlet hose to the fittings on P-101 outlet valve HIV-115 and on the collection container.

NOTE: *Rags or other absorbent material may be used to clean water from surfaces. Any spent rags or absorbent material must be managed as consistent with Steps 4.8.14 and 4.8.15.*

4.8.3 Open valves HIV-102, HIV-113, and HIV-115.

CAUTION

If pump P-101 is run dry, rotating parts may be damaged.

4.8.4 Do not run pump if dry.

4.8.5 Place HS-802 in the HAND position to start pump P-101.

NOTE: *GLOBAL HAND SWITCH WARNING LMP-806 will flash when HS-802 is in the HAND position.*

4.8.6 IF the V/L separator water level decreases below the lower view port OR approximately 5-gal of liquid are pumped into the collection container,
THEN place HS-802 in the OFF position.

4.8.7 IF the V/L separator water level is below the lower view port, THEN **GO TO** Step 4.8.11.

4.8.8 Connect the outlet hose to another collection container and place the lid on the filled container.

4.8.9 Repeat Steps 4.8.5 through 4.8.8, to empty the V/L separator.

4.8.10 Close valves HIV-102, HIV-113, and HIV-115.

4.8.11 Ensure the lid is placed on the container.

4.8.12 RCT: Perform radiological surveys of fittings, outlet hose, and sample container(s).

NOTE: *The container(s) of water from the V/L separator must be managed as Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste unless and until analysis of the water and guidance from Waste Generator Services (WGS) staff calls for management under a different protocol. After process knowledge through analysis of a sufficient number of samples is established, WGS may provide waste management guidance based on this knowledge.*

(JSA)

4.8.13 Label the container(s) with label(s) obtained from the OFTL.

NOTE: *The container(s) must be held in a heated Waste Area Group (WAG) 7 CERCLA waste storage area when freezing temperatures are expected.*

4.8.14 Place the labeled container(s) in a WAG 7 CERCLA waste storage area.

4.8.15 Request WGS staff to sample, analyze, and dispose of the water.

4.9 Shutdown Alarms

NOTE: *Shutdown alarms occur when limits of acceptable operation are exceeded during VVET unit operations. Shutdown alarms result in a shutdown of the unit.*

4.9.1 IF a shutdown alarm, as indicated by the OIT audible alarm, or by SCADA indication, is activated,
THEN determine which alarm indicator is activated and resolve the cause of the alarm using information from Table 4 and the SE.

4.9.2 WHEN the cause of the shutdown is determined, understood, and corrected,
THEN **GO TO** Step 4.1.2 to initiate restart of the unit.

Table 4. Shutdown alarms.

Alarm OIT Indicator	Setpoint	System Response	Corrective Action
FT-101	200 scfm	Low total flow. OIT will indicate if the process flow drops below 200 scfm for 30 seconds. The unit will enter time-delayed shutdown mode. The system has 30 seconds for the flow to increase to minimum flow rate setpoint. If minimum flow is not satisfied within this time, the system will shut down.	Ensure well isolation valve FCV-101 and well isolation valves HIV-150 and HIV-170 are in the OPEN position in run mode. Ensure proper function of recirculation valve FCV-112.
FT-101	600 scfm	High total flow. OIT will indicate if the process flow is above 600 scfm for 30 seconds. The unit will enter time-delayed shutdown mode.	Verify proper function of recirculation valve FCV-112.
TE-101	250°F	OIT will indicate if the extraction blower discharge temperature exceeds 250°F. The unit will enter time-delayed shutdown mode.	Ensure that the blower outlet is not at a high pressure (PI-102) and that process flow is at setpoint.
Alarm OIT Indicator	Setpoint	System Response	Corrective Action
TE-150A TE-151 TE-170 TE-171	55°F	Low wellhead or manifold temperature. OIT will indicate if the well gas heater exit or well gas manifold entry temperature is below 55°F. The system will enter time-delayed shutdown mode. (Alarm active in run mode only. Once in run mode, 55°F must be achieved in 5 minutes.)	Ensure that well heaters are enabled and insulations in place.
TE-150A TE-170	200°F	High well head temperature. OIT will indicate if the well gas heater exit is above 200°F. The unit will enter time-delayed shutdown mode.	Ensure proper function of well heaters. Ensure proper TE-15 and/or TE-171 control loop setpoint value.
TE-151 TE-171	125°F	High manifold temperature. OIT will indicate if the well gas manifold entry temperature is above 125°F. The unit will enter time-delayed shutdown mode.	Ensure proper function of well heaters. Ensure proper TE-151 and/or TE-171 control loop setpoint value.

Table 4. (continued).

TE-301 TE-302	850°F	Low reaction temperature. OIT will indicate if the catalyst bed inlet or outlet temperature drops below 850°F for 10 seconds. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Ensure proper function of the preheater. Ensure proper TE-301 or TE-302 setpoint value.
TE-301 TE-302	1050°F	High reaction temperature. OIT will indicate if the catalyst bed inlet or outlet temperature rises above 1050°F. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Ensure proper function of the preheater. Ensure proper TE-301 or TE-302 setpoint value. Feed of organic materials at excessively high concentration may result in high reaction temperature. Test reactor inlet composition for organic content.
TE-303	600°F	High exhaust temperature. OIT will indicate if the exhaust temperature rises above 600°F. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Verify proper function of TE-303 and proper reaction temperature.
TE-303	350°F	Low exhaust temperature. OIT will indicate if the exhaust temperature falls below 350°F for 10 seconds. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Verify proper function of TE-303 and proper reaction temperature.
Alarm OIT Indicator	Setpoint	System Response	Corrective Action
FT-150 FT-170A, B, and (Total flow)	50 scfm	Low well flow. OIT will indicate if well flows drop below 50 scfm for 10 minutes. (The alarm will not reset until the flow reaches 70 scfm.) The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Ensure wellhead isolation valves are open. Ensure proper function of differential pressure transmitter.
FT-150 FT-170A, B, and C (Total flow)	550 scfm	High well flow. OIT will indicate if well flow rises above 550 scfm for 10 minutes. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Ensure proper function of recirculation valve FCV-112 and the differential pressure transmitter.

4.10 Normal Shutdown

NOTE: *The control system is programmed to affect the following actions:*

A. Auto ambient air valve FCV-107 opens as indicated by LMP-808 energizing

B. Pre-heater HTR-201 de-energizes as indicated by indicator lamp LMP-803 de-energizing

C. Ten seconds after receiving the shutdown signal, well isolation valve, FCV-101, closes as indicated by LMP-805 energizing

D. Well heater HTR-150 and/or HTR-170 de-energizes as indicated by LMP-850 and/or LMP-870 de-energizing

E. Blower BLO-101 stops after a 2-minute purge as indicated by lack of sound of the blower operating or by indicator lamp LMP-801 de-energizing.

4.10.1 Press and hold for 2 seconds then release the STOP button on the OIT.

4.10.2 IF the system is to be promptly restarted,
THEN, upon direction from the OFTL or SE, **GO TO** Step 4.2 to initiate restart of the system.

4.10.3 IF the system is not to be promptly restarted,
THEN **GO TO** Step 4.12 and complete post shutdown activities.

4.11 Emergency Shutdown

NOTE: *The control system is programmed to affect the same actions as Step 4.12, except that blower BLO-101 stops immediately.*

4.11.1 Push in the ESD button on PP-600.

4.11.2 IF time and conditions permit (for example, if an immediate evacuation is not required),
THEN **GO TO** Step 4.12.

4.12 Post Shutdown Activities

4.12.1 Place all HOA switches on PP-600 to the OFF position.

4.12.2 Close well isolation valve HIV-150 and/or HIV-170.

4.12.3 Complete other post shutdown activities requested by the OFTL or SE.

5. RECORDS

Records Description	Uniform File Code	Disposition Authority	Retention Period
TPR-1662 Case File	0250	A16-1.1	Cutoff when superseded, obsolete, or cancelled.
Pre-job and Post-job Reviews and Checklists	Maintain in accordance with MCP-3003		
VVET Log Sheets[a]	7305	ENV1-e-6	Destroy when 75 years old.

[a] VVET operations include the maintenance of a separate set of logs for each operating unit. Each set includes two log sheets to be completed daily, described as follows:

- Operating Log serves as a record for the operator's periodic observation and entry of instrument readouts and equipment operating parameters during their shift inspections.
- Narrative Sheet is used to generate a history of conditions, events, problems, accomplishments, and so forth, for each unit.

6. REFERENCES

Company-wide Manual 9, Operations

DOE/ID-10587, Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites

Electrical One-line Drawing (DWG-515650)

Final Remedial Design/Remedial Action Workplan, Organic Contamination in the Vadose Zone, Operable Unit 7-08 (by Scientech Inc., SCI-COM-200-95)

INEL-96/0119, Health and Safety Plan for the Vapor Vacuum Extraction with Treatment for the Organic Contamination in the Vadose Zone at the Radioactive Waste Management Complex, Operable Unit 7-08

INEL/EXT-99-00907, Field Sampling Plan for Operations and Monitoring Sampling Conducted in Support of the Organic Contamination in the Vadose Zone Remediation Project

LST-18, Conduct of Operations Conformance Matrices for the RWMC (DOE Order 5480.19)

MCP-3003, Performing Pre-job Briefings and Post-job Reviews

MCP-3562, Hazard Identification, Analysis, and Control of Operational Activities

Piping and Instrumentation Drawings (DWG-515640, -515641, and -515642)

STD-101, Integrated Work Control Process

TPR-4910, Logbook practices for ER and Deactivation, Decontamination, and Decommissioning Projects.

7. APPENDIXES

Appendix A, Catalytic Oxidizer Operational Modes

Appendix B, Component Line Up

Appendix C, Procedure Basis

Appendix A

Catalytic Oxidizer Operational Modes

The four operational modes of the VVET catalytic unit are described below:

Mode	Description	Cause of Entry into Mode
Preheat	Ambient air is drawn into the blower, preheated, and passed through the reactor. The catalyst bed inlet and outlet are heated to a minimum of 950°F and 850°F, respectively, and the exhaust is heated to 350°F.	Pushing the START button on the OIT.
Run	When system temperature is stabilized at the desired flow rate, processing of process vapor is initiated.	Completion of successful preheat cycle, at which time, the following conditions must exist: TE-301 ≥ 950°F TE-302 ≥ 850°F TE-303 ≥ 350°F TE-150 and/or TE-170 ≥ 55°F (This temperature must be achieved within 5 minutes after HIV-101 is opened.) TE-151 and/or TE-171 ≥ 55°F (This temperature must be achieved within 5 minutes after HIV-101 is opened.)
Time Delayed Shutdown	The system shuts down automatically. The blower remains on for 2 minutes after the system enters the instant shutdown mode.	The system enters the time-delayed shutdown mode when? The STOP button on the OIT is pressed Any thermocouple signal is lost Flow transmitter FT-101 signal is lost The V/L separator reaches the high-high level limit HOA switches HS-801, HS-803, and HS-804 are not in the AUTO position Any SCR is not functional High temperature on a temperature element.
Instant Shutdown	The system shuts down automatically. The blower shuts down immediately upon the system entering the instant shutdown mode.	The system enters instant shutdown mode when: The ESD button is pushed in There is an alarm condition on any of the following temperature switches: TS-801, TS-850, TS-860, TS-860, TS-870, TS-880 The blower motor is overloaded.

Appendix B

Component Line Up

Part A: Manually Operated Valves

Valve Number	Related Component	Normal Pre-start Position	Comment
FCV-106	Ambient air inlet	0-30% Open	Technician judgment is used in positioning.
HIV-102	P-101 inlet	Closed	
HIV-113	P-101 outlet pressure gauge PI-103	Closed	
HIV-115	P-101 outlet	Closed	
HIV-150	Well isolation	Open	Open if respective well is in operation.
HIV-160	Well isolation (SPARE)	Closed	
HIV-170	Well isolation	Open	Open if respective wells are in operation.
HIV-180	Well isolation (SPARE)	Closed	
HIV-151	PDT-150 and PDI-150	Open	Valve is throttled to minimize pressure fluctuation to instrument.
HIV-152	PDT-150 and PDI-150	Open	Valve is throttled to minimize pressure fluctuation to instrument.
HIV-111	Process air sample	Closed	
HIV-110	PI-102	Open	Valve is inside of CP-800.[a]
HIV-108	PDT-101 and PDI-101	Open	Valve is inside of CP-800[a] and is throttled to minimize pressure fluctuation to instrument and normally will not be re-adjusted unless Step 4.3.1.6 is completed.
HIV-109	PDT-101 and PDI-101	Open	Valve is inside of CP-800[a] and is throttled to minimize pressure fluctuation to instrument and normally will not be re-adjusted unless Step 4.3.1.6 is completed.
HIV-195	Radiological continuous sampler subsystem inlet	Open	If valve is found unexpectedly closed, then the RCT foreman must be notified.
HIV-196	Radiological continuous sampler subsystem outlet	Open	If valve is found unexpectedly closed, then the RCT foreman must be notified.
HIV-105	PI-101 isolation	Open	
HIV-116	Blower oil drain	Closed	If valve is found open, actions must be taken to refill BLO-101 with oil.

Valve Number	Related Component	Normal Pre-start Position	Comment
FCV-170A		Open	Technician judgment is used in positioning.
FCV-170B		Open	Technician judgment is used in positioning.
FCV-170C		Open	Technician judgment is used in positioning.
HCV-170A		0-100% Open	Technician judgment is used in positioning.
HCV-170B		0-100% Open	Technician judgment is used in positioning.
HCV-170C		0-100% Open	Technician judgment is used in positioning.

[a] Do not adjust valves of CP-800 if the transparent cover that prevents contact with the 120 V conductors is not in place. Close and latch the CP-800 cover if the transparent cover is not in place.

Part B – Electrical Power Supply (NO exposed conductors)

NOTE: *The SS must give approval prior to placing a breaker switch in the ON position if the breaker switch is found tripped (instead of being intentionally in the OFF position).*

Component Number or Breaker Location within LP1	Component Name (and Component Supplied)	Normal Pre-start Position	Comment
DSW-150	Disconnect switch (well head heater HTR-150)	ON	
DSF-811	Fused disconnect switch [CB-1 (LP1 via XFR-LP1) and CB-2 (DSF-UH2) within PP-811]	ON	
DSW-670	Disconnect switch (well head heater HTR-170)	ON	
CB-600	Disconnect switch (PDB-601)	ON	
DSF-600	Fused disconnect switch [BLO-101, P-101, HTR-210 (both circuits), and HTR-150]	ON	
DSF-UH2	Fused disconnect switch (480 vac enclosure heater)	ON	Can be placed in the OFF position during periods of above-freezing ambient temperatures.
13	Breaker switch (HTR-101)	ON	Can be placed in the OFF position during periods of above-freezing ambient temperatures.
15/17	Spare	OFF	
19/21	Breaker switch [UHTR-1 (240 vac enclosure heater)]	ON	Can be placed in the OFF position during periods of above-freezing ambient temperatures.
23	Breaker switch [HTT-101 (Well line heat tape)]	ON	A thermostat controls the heat tape, but no manual adjustment of the thermostat setpoint is required.
39/41	Breaker switch (Main-B phase/ Main-A phase)	ON	
14	Breaker switch (ACU-801)	ON	ACU-801 is located in the box attached to PP-600.
16	Breaker switch (PP-600 control panel)	ON	
18	Breaker switch [Skid light (east side)]	ON	

Appendix B

Component Number or Breaker Location within LP1	Component Name (and Component Supplied)	Normal Pre-start Position	Comment
20	Breaker switch (HTR-801, HTR-802)	ON	Both heaters have manually adjusted thermostats. HTR-801 is in PP-600 and HTR-802 is in CP-800.
22	Breaker switch (Enclosure lights and sensor light)	ON	
24	Breaker switch [Receptacles (enclosure and outside)]	ON	
26	Breaker switch [Receptacles (enclosure) and skid light (south)]	ON	
25	Breaker switch (FCV-170A, B, and C. RCPT-800A, B, and C.	ON	

Part C – Electrical Power Supply (480 vac exposed conductors)

NOTE 1: *The positioner for the circuit breakers in PP-811 must be an electrician.*

NOTE 2: *If the breaker switch is found tripped (instead of being intentionally in the OFF position), the SS must give approval prior to placing a breaker switch in the ON position.*

Breaker Number within PP-811	Component Name (and Component Supplied)	Normal Pre-start Position	Comment
CB-1	Circuit Breaker (LP1 via XFR-LP1)	ON	
CB-2	Circuit Breaker (DSF-UH2)	ON	DSF-UH2 provides power to the 480 vac enclosure heater.
CB-3	Spare Circuit Breaker	OFF	

Appendix B

Appendix C

Procedure Basis

Step	Basis	Source Document	Citation
General	Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, or drawings that include appropriate quantitative or qualitative acceptance criteria for determining that prescribed results have been satisfactorily attained.	PRD-5076	4.1.1.1
All	Work scope	King, Buck Technology HD CatOx™ Model HD-500 Operation and Maintenance Manual	
2.3, 2.5-2.7, 2.10-2.13, 3.2, 3.7, 3.9, 3.21, 4.1.3, 4.6.2.1, 4.6.3.2, Note 2 preceding 4.7.2, Note preceding 4.7.2.1, 4.7.3.2, 4.8.1, Note preceding 4.8.13	Implementation of JSA requirements.	RWMC JSA-276 and -6572	

STANDARD OPERATING PROCEDURE

VVET UNITS E AND F CATALYTIC OXIDIZER STARTUP, OPERATION, AND SHUTDOWN

Facility/System: VVET Catalytic Oxidizer Units E and F

REVIEWERS	Required (X)
RWMC Radiological Engineer	X
RWMC Rigging Engineer	
RWMC Industrial Safety Engineer	X
RWMC Quality Engineer	X
RWMC Industrial Hygienist	X
RWMC Environmental Engineer	X
RWMC Fire Protection Engineer	X
RWMC Criticality Engineer	
RWMC System Engineer	X
RWMC Operations	X
Other	

CONTENTS

TABLES

1. INTRODUCTION

1.1 Purpose

The vapor vacuum extraction with treatment (VVET) catalytic oxidation units are operated as part of environmental actions for Operable Unit (OU) 7-08, Organic Contamination in the Vadose Zone (OCVZ) at the Radioactive Waste Management Complex (RWMC).

1.2 Scope and Applicability

This procedure directs the startup, routine operation, response to alarms, and shutdown of the VVET catalytic oxidation Units E and F. Both normal (Section 4.9) and emergency (Section 4.10) shutdowns are covered. This procedure applies to all personnel who operate VVET Units E and F.

2. PRECAUTIONS AND LIMITATIONS

NOTE 1: *Units E and F are equipped with a programmable logic controller (PLC). One of the PLC's functions is to ensure the oxidizer stays within acceptable operating conditions.*

NOTE 2: *The PLC will automatically shut down the oxidizer if operating parameters move outside of the acceptable conditions. Table 4 provides the limits of acceptable operating conditions.*

2.1 Key Units E and F operating parameters with corresponding limiting and design values are given in Table 1.

Table 1. Units E and F limiting and design values for normal operations.

Operating Parameter	Minimum	Maximum	Design
Well Head Heater Exit Temperature	55°F	200°F	60-120°F
Catalyst Inlet Temperature	850°F	1050°F	850-950°F
Catalyst Outlet Temperature	850°F	1050°F	850-950°F
Process Vapor/Ambient Air Flow	200 scfm	600 scfm	250-550scfm
Wellhead Pressure	0 in. wc	195 in. wc (vac)	10-180 in. wc (vac)

2.2 Operating VVET units outside normal and acceptable operating conditions could result in poor efficiency with respect to destruction of organic contaminants in the process vapor or damage to the oxidizer unit and its components.

2.3 All personnel performing steps in this procedure must meet RWMC access training requirements.

(JSA)

2.4 Only VVET technicians listed on the RWMC Qualified Watch Standers List are authorized to perform the actions described in this procedure. The only exceptions to this requirement are:

- Personnel who are involved in on-shift training and who are under the direct and immediate supervision of an authorized VVET technician
- OCVZ technical support staff who are supporting an authorized VVET technician under Step 2.7
- Analyst receiving samples and returning empty sample bags.

2.5 Entry into the Unit E and F fenced area requires compliance with INEL/EXT-03-00467, Health and Safety Plan (HASP). This includes use of personal protective equipment specified by postings on the fence surrounding Units E and F.

(JSA)

2.6 Enclosure doors must be secured from striking personnel during windy weather.

(JSA)

2.7 Repairs, troubleshooting, and corrective maintenance requiring craft work must be done per Standard (STD)-101, Integrated Work Control Process. However, VVET technicians are allowed to perform limited troubleshooting and adjustments/problem resolution following approval from the System Engineer (SE) or designated alternate.

2.8 Prior to leaving Units E and F operating and unmanned between noncontiguous shifts, the VVET technician must ensure the unit is in run mode and is operating in a safe and stable manner, or in safe shutdown mode.

2.9 Caution must be used when moving around equipment to avoid being caught between objects/machinery.

(JSA)

2.10 Caution must be used to avoid hot surfaces on equipment/lines.

(JSA)

2.11 Body position awareness must be used to avoid injury from bumping into protruding objects or tripping hazards. Use yellow and black tape as required by safety engineer to mark protruding or tripping hazards.

(JSA)

2.12 Minimum personal protective equipment (PPE) for access into OCVZ Units E and F is safety-toed boots and safety glasses with side shields.

(JSA)

3. PREREQUISITES

3.1 IF Unit E or F has undergone significant [as determined by the SE or Project Engineer (PE)] repairs or modifications,
THEN, prior to resuming normal operations, testing to demonstrate compliance with design and/or operating requirements has been performed in accordance with management control procedure (MCP)-3056, Test Control.

3.2 If a breaker switch on MCC-600 is found tripped (instead of being intentionally in the OFF position), the Shift Supervisor (SS) has given prior approval to place a breaker switch in the ON position

3.3 The VVET technician has access to two-way wireless communication (that is, radio or cellular telephone), capable of contact with the SS, while performing the activities outlined in this procedure.

(JSA)

3.4 IF a VVET technician is not present at RWMC for seven or more consecutive calendar days,
THEN the technician has reviewed entries in the Unit E or F Narrative Logbook for the days the technician was away from RWMC
AND documented the review in the logbook.

3.5 The VVET technician has ensured from the operator interface terminal (OIT) that P-101, BLO-101, FCV-107, and FCV-101 are in the automatic mode.

3.6 The SE or designee has documented the desired setpoints for individual well line manifold temperatures for selected well(s), reference Table 2, total system flow rate (UIT-101), catalyst inlet temperature (TE-301), and vapor liquid separator vacuum (PIT-102), reference Table 4, in the Unit E or F Narrative Logbook.

3.7 Hot surfaces (>125° F) are posted to warn of hazards.

(JSA)

Table 2. Unit well line, well, and manifold temperature element identification.

UNIT	WELL LINE	WELL	MANIFOLD TEMP ELEMENT/	UNIT	WELL LINE	WELL	MANIFOLD TEMP ELEMENT/
E				F	F-140	SE3	TE-140
						IE3	
	E-140	SE7	TE-140			DE3	
		IE7			F-150	SE8	TE-150
		DE7				IE8	
	E-150	DE1	TE-150			DE8	
		6E			F-160	2E	TE-160
	E-160	8901D	TE-160		F-170	IE4	TE-170
						DE4	
						7E	

3.8 A pre-job brief has been performed in accordance with MCP-3003, Performing Pre-job Briefings and Documenting Feedback, that covers, but is not limited to, the following:

A. HASP

B. Potential hazards and hazard controls associated with Subsurface Disposal Area (SDA) entry

C. Potential hazards and hazard controls associated with entering the Unit E or F fenced area, working within the enclosure, and with specific job steps (RWMC JSA-6572, and Facility Hazards List)

D. Verify RWMC and site specific training is documented for personnel entering the OCVZ designated work areas.

3.9 A walk down of the areas outside and inside the enclosure has been performed and the general conditions and following specific items have been observed:

(JSA)

A. Placement and condition of fencing and postings

B. Housekeeping

C. Major equipment configuration (must be interconnected as shown on the Piping and Instrumentation Diagrams [P&IDs]) and condition

D. Lockout/tagouts (none are expected)

E. Placement and condition of machine guarding

F. Placement and condition of electrical covers

G. Water level in vapor liquid (V/L) separator (must be below middle view port)

H. Positions of well isolation valve FCV-101 (must be fully closed) and ambient air intake valve FCV-107 (must be fully open)

I. Placement and condition of the two fire extinguishers

J. Placement of first aid kit and eyewash bottles.

NOTE: *The technician has consulted with the Operations Field Technician Lead (OFTL) or SE to determine the desired position of a component whose desired position is weather-dependent (for example, a unit enclosure heater circuit breaker).*

3.10 IF directed by the OFTL or SE,
THEN the components listed in Part A and/or B of Appendix B are positioned OR the components are already in the desired position.

3.11 IF the EMERGENCY SHUTDOWN (ESD) button was in the pushed-in position AND the reason the ESD button was in the pushed-in position has been resolved, THEN the ESD button has been placed in the pulled out position.

3.12 Supplied power status to MCC-600 is verified by viewing the operator interface terminal (OIT).

3.13 IF the OIT indicated any alarms,
THEN all alarm conditions indicated on the OIT have been corrected
AND all alarms have been cleared from the OIT by acknowledging each alarm individually.

3.14 The PE, SE, or designee has documented in the logbook the well cycle, desired wells, flow rates and percent open for the valve position, as appropriate, and required set points.

3.15 Tedlar® sample bags are staged.

3.16 All problems are resolved prior to proceeding with this procedure, unless completion of Section 4.7 is necessary to empty the V/L separator.

4. INSTRUCTIONS

4.1 General Instructions

NOTE 1: *The following instructions involve the identification of VVET catalytic oxidizer components with truncated alphanumeric designations (for example FCV-107, instead of VVEF-FCV-107) for ease of use of this procedure. Designated components can be found in the P&IDs.*

NOTE 2: *This procedure covers the four operational modes of the catalytic oxidizer. The four modes are discussed in Appendix A.*

NOTE 3: *Unless otherwise directed or allowed by this procedure, the technician will exit this procedure if a step cannot be completed. The technician will then notify the OFTL or SE.*

4.1.1 Ensure all of the prerequisites have been met.

4.1.2 Notify SS and OFTL of changes in a unit's status, abnormalities, difficulties encountered while performing assigned tasks, or other unexpected events.

4.1.3 Notify the Radiological Control Technician (RCT) Foreman when the following occurs:

- Vapor extraction is interrupted for more than one shift
- A VVET unit is returned to routine, sustained operations.

(JSA)

4.1.4 GO TO the appropriate procedure section from the following table, based on the desired task to be performed,
THEN RETURN TO this step, unless otherwise directed.

NOTE: *The technician may proceed to Section* 4.9 or 4.10 *as soon as a warning or shutdown alarm is observed.*

Task	Section
Start up VVET unit/preheat mode.	GO TO Section 4.2
VVET Unit Startup/run mode.	GO TO Section 4.3
Perform routine surveillance and adjust parameters.	GO TO Section 4.4
Process inlet stream sampling and sample handling (inside enclosure).	GO TO Section 4.5
Process inlet stream sampling and sample handling (outside).	GO TO Section 4.6
Manual pumping of collected water from the V/L separator.	GO TO Section 4.7
Respond to shutdown alarms.	GO TO Section 4.8
Perform normal shutdown.	GO TO Section 4.9
Perform emergency shutdown.	GO TO Section 4.10
Perform post shutdown activities.	GO TO Section 4.11

4.2 VVET Unit Startup/Preheat Mode

NOTE: *All steps will be performed by a qualified VVET technician unless specified otherwise.*

NOTE: *The following unit startup steps may be performed from a remote location by a qualified technician. In addition to completion of these specific steps, the technician monitors the startup process and responds appropriately (for example, to shutdown alarms).*

4.2.1 Press and release the STARTUP MENU button.

4.2.2 Press and release the FIXED/TIMED button from the Chose Well Cycle Screen for either fixed mode or timed mode as identified by the PE, SE, or designee in the logbook.

4.2.2.1 IF the timed mode is identified,
THEN GO TO Step 4.2.2.10.

4.2.2.2 IF the fixed mode cycle is identified,
THEN press and release the CONTINUE STARTUP button.

4.2.2.3 Press and release the PRESS TO SELECT WELLS FOR WELL SET button for desired well(s).

4.2.2.4 Press and release the button for each desired well in that selected set as identified by the PE, SE, or designee in the logbook.

4.2.2.5 Press and release the MANUAL/AUTO button for selected well(s) and select desired mode.

4.2.2.6 IF AUTOMATIC mode is selected,
THEN press and release the button below the MANUAL/AUTO indicator
AND enter the desired flow rate set point on the keypad for each well selected as identified by the PE, SE, or designee in the logbook,
THEN press and release the CLOSE button.

4.2.2.7 IF MANUAL mode is selected,
THEN press and release the button below the MANUAL/AUTO indicator
AND enter the desired percent open set point on the keypad for each well selected as identified by the PE, SE, or designee in the logbook
THEN press and release the CLOSE button.

4.2.2.8 Repeat Steps 4.2.2.3 through 4.2.2.7 for additional desired wells.

4.2.2.9 WHEN well(s), modes, and set points have been identified,
THEN press and release the BACK button,
THEN press and release the CONTINUE STARTUP button
THEN GO TO Step 4.2.2.18.

4.2.2.10 IF the timed mode cycle is pressed,
THEN press and release the CONTINUE STARTUP button.

4.2.2.11 Press and release the PRESS TO SELECT WELLS FOR WELL SET button for desired well(s).

4.2.2.12 Press and release the button for each desired well in that selected set as identified by the PE, SE, or designee in the logbook.

4.2.2.13 Press and release the MANUAL/AUTO button for selected well(s) and select desired mode.

4.2.2.14 IF AUTOMATIC mode is selected,
THEN press and release the button below the manual/auto indicator and enter the desired flow rate set point on the keypad for each well selected as identified by the PE, SE, or designee in the logbook,
THEN press and release the CLOSE button,
THEN press and release the BACK button.

4.2.2.15 IF MANUAL mode is selected,
THEN press and release the button below the MANUAL/AUTO indicator and enter the desired percent open set point on the keypad for each well selected as identified by the PE, SE, or designee in the logbook,
THEN press and release the CLOSE button,
THEN press and release the BACK button.

4.2.2.16 Press and release the button below operation hours for selected well sets,
THEN enter the desired operation hours on the keypad for each well set as identified by the PE, SE, or designee in the logbook.

4.2.2.17 Repeat Steps 4.2.2.11 through 4.2.2.16 for additional desired wells.

4.2.2.18 For each well to be operated verify corresponding valve(s) to be opened as shown in Table 3.

4.2.2.19 Verify the valves from the wells not in use are fully closed.

4.2.2.20 WHEN well(s) and set points have been identified,
THEN press and release the CONTINUE STARTUP button.

4.2.2.21 IF the desired set point for the system flow rate at UIT-101 is not already set and documented in the unit logbook,
THEN press and release the SCFM button at the bottom of the scale for UIT-101 system flow rate
AND enter the desired flow rate set point of between 250-550 SCFM on the keypad as identified by the PE, SE, or designee in the logbook.

4.2.2.22 IF the desired set point for catalyst inlet temperature at TE-301 is not already set and documented in the unit logbook,
THEN press and release the DEGREES FAHRENHEIT button at the bottom of the scale for TE-301 catalyst inlet temperature
AND enter the desired inlet temperature set point of between 850-950° F on the keypad as identified by the PE, SE, or designee in the logbook.

4.2.2.23 IF the desired set point for the vapor liquid separator vacuum at PIT-102 is not already set and documented in the unit logbook,
THEN press and release the INCHES WATER COLUMN button at the bottom of the scale for PIT-102, vapor liquid separator vacuum
AND enter the desired vacuum pressure set point of between 10 and 180 IWC on the key pad as identified by the PE, SE, or designee in the logbook,
THEN press and release the well head heater set points button.

WARNING

Operation of the process vapor inlet manifold at a temperature higher than 125° F could result in personnel injury.

4.2.2.24 IF the set points of well line manifold temperature elements identified for each unit in Table 2, on the OIT is/are not at the value(s) for selected wells specified by the PE, SE, or designee,
THEN adjust the set points of between 60 and 120° F.

4.2.2.25 Press and release the BACK button,
THEN press and release the CONTINUE STARTUP button.

4.2.2.26 IF the technician is satisfied that all startup parameters have been set,
THEN press and release the start unit button on the system process screen.

4.2.2.27 Press and release the YES button on the startup blower menu screen,
THEN press and release the CLOSE button.

NOTE: *The control system is programmed to initiate the following actions:*

A. Blower BLO-101 starts

B. Preheater HTR-201 is energized approximately 120 seconds after UIT-101 reaches 200 scfm.

4.2.2.28 IF blower BLO-101 operates with unusual noise or vibration,
THEN IMMEDIATELY push and release the STOP button on the OIT or place the ESD button in the pushed-in position
AND do NOT proceed to the next step.

4.3 VVET Unit Startup/Run Mode

NOTE 1: *The system will automatically move into run mode when the conditions described in Appendix A for run mode are achieved. The control system is programmed to initiate the following actions for run mode:*

A. Well isolation valve FCV-101 opens to allow flow of process vapor to the oxidizer

B. Well heater for selected well(s) energizes, as indicated on the OIT after the respective well flow reaches 60 scfm.

NOTE 2: *The control system will automatically shut down Unit E or F if the conditions described in Appendix A for run mode are not achieved within 2 hours of pushing the start button.*

NOTE 3: *At the discretion of the VVET technician, the position of FCV-106 may be adjusted at any time during completion of Section 4.3. to ensure a smooth transition from preheat mode to run mode.*

4.3.1 Using the OIT, adjust the setpoint of total system process flow rate UIT-101 to a value between 250 to 550 scfm as documented by the PE, SE, or designee, in the Unit E or F Narrative Logbook (see Step 3.6).

4.3.1.1 Ensure total system process flow UIT-101 stabilizes at the setpoint.

4.3.1.2 Ensure catalyst inlet temperature TE-301, and manifold temperature of the respective well(s), reference Table 2, stabilize at their respective setpoints.

4.3.2 IF automatic operation is selected,
THEN have the PE, SE, or designee document in the Unit E or F Narrative Logbook the desired flow and rotation time for each set of wells to be used for processing
AND have the technician select the well cycle(s) on the OIT.

Table 3. Well and valve identification

UNIT E			
WELL	**VALVES**	**WELL**	**VALVES**
SE7	FCV-140A	8901D	FCV-160A
	HIV-141		HIV-161
IE7	FCV-140B	DE1	FCV-150B
	HIV-141		HIV-151
DE7	FCV-140C	6E	FCV-150A
	HIV-141		HIV-151
UNIT F			
WELL	**VALVES**	**WELL**	**VALVES**
SE3	FCV-140A	DE8	FCV-150C
	HIV-141		HIV-151
IE3	FCV-140B	2E	FCV-160A
	HIV-141		HIV-161
DE3	FCV-140C	IE4	FCV-170B
	HIV-141		HIV-171
SE8	FCV-150A	DE4	FCV-170C
	HIV-151		HIV-171
IE8	FCV-150B	7E	FCV-170A
	HIV-151		HIV-171

4.4 Routine Surveillance and Parameter Adjustment

NOTE 1: *Adjustments to the setpoints of total system process flow rate UIT-101 and respective well line manifold temperature, reference Table 2, may be made upon approval from the PE, SE, or designee (and documentation in the Unit E or F Narrative Logbook).*

NOTE 2: *Adjustments to the setpoints of catalyst inlet temperature TE-301 may be made upon approval from the PE, SE, or designee (and documentation in the Unit E or F Narrative Logbook).*

NOTE 3: *Regularly scheduled shift is Monday through Thursday, 7:00 AM to 5:30 PM.*

4.4.1 Complete routine surveillance tasks during each regularly-scheduled shift.

4.4.1.1 Complete equipment checks and monitor equipment conditions on the appropriate page identified in the Narrative Logbook.

4.5 Process Inlet Stream Sampling and Sample Handling (Inside Enclosure)

NOTE 1: *INEEL/EXT-99-00907, Field Sampling Plan for Operations and Monitoring Sampling Conducted in Support of the Organic Contamination in the Vadose Zone Remediation Project, does not require the use of chain-of-custody forms for VVET unit process inlet samples.*

NOTE 2: *Process samples inside the enclosure are taken during normal operations on scheduled work days. Samples may be taken any time as requested by the Project Engineer and/or Radiological Engineering.*

NOTE 3: *Smears/swabs taken in this section during performance of radiological surveys for alpha, beta/gamma, and tritium contamination will be counted in the laboratory following field activities.*

4.5.1 IF the Tedlar® sample bags are returned from the analytical laboratory not empty or not in usable condition,
THEN obtain empty, useable bags
AND dispose of the unusable bags as cold waste.

NOTE: *The sample number consists of the unit designation, date, and time (for example, D062502@0730).*

WARNING

Opening valve without sample bag attached could release volatile organic compounds (VOCs) into the enclosure.

4.5.2 Attach the labeled sample bag to the flexible tube.

(JSA)

4.5.3 Open valve HIV-111 and the sample bag valve.

4.5.4 Fill the bag about 1/2 to 3/4 full.

4.5.5 Close the valves.

4.5.6 Remove the sample bag from the flexible tube and place the bags in secured storage.

4.5.7 Document the sampling evolution in the narrative logbook.

4.5.8 WHEN directed by the SE or OFTL,
THEN prepare bags containing process vapor for transport to the analytical laboratory.

4.5.8.1 RCT: Perform radiological surveys of fittings, outlet hose, and sample container(s).

4.5.8.2 Have the bags checked for free release by radiological control (RadCon) personnel.

(JSA)

4.5.8.3 IF the bags cannot be free released by RadCon personnel, THEN label and handle the bags per instructions from RadCon personnel.

4.5.8.4 Place the bags in a sturdy protective container (for example, a rigid plastic box).

4.5.8.5 Ensure the box's label describes the contents and lists at least two points-of-contact.

4.5.9 VVET TECHNICIAN OR ANALYST: Transport bags to the laboratory for analysis and, if appropriate, turn the bags over to the person who will perform the analysis.

4.6 Process Inlet Stream Sampling and Sample Handling (Outside Enclosure)

NOTE 1: *INEEL/EXT-99-00907 does not require the use of chain-of-custody forms for VVET unit process inlet samples.*

NOTE 2: *Process samples outside at the wells will be taken as requested by the PE and/or Radiological Engineering.*

NOTE 3: *Smears/swabs taken in this section during performance of radiological surveys for alpha, beta/gamma, and tritium contamination will be counted in the laboratory following field activities.*

4.6.1 IF the Tedlar® sample bags are returned from the analytical laboratory not empty or not in usable condition,
THEN obtain empty, useable bags
AND dispose of the unusable bags as cold waste.

NOTE 1: *The sample number consists of the well designation, date, and time (for example, SE6102503@0730).*

NOTE 2: *To avoid exposure to VOCs, personnel should avoid contact with the process vapor air and position upwind.*

(JSA)

NOTE 3: *The pump should be contained in a weather-resistant container during operation and should be GFCI protected.*

(JSA)

4.6.1.1 Hook up the power supply for the pump.

4.6.1.2 Attach the pump to the quick disconnect on the well line to be sampled.

4.6.1.3 Start pump.

4.6.1.4 Purge the line for approximately 5 seconds.

4.6.1.5 Attach the labeled sample bag to the flexible tube.

4.6.1.6 Fill the bag about 1/2 to 3/4 full.

4.6.1.7 Turn the pump OFF.

4.6.1.8 Remove the sample bag from the flexible tube

4.6.1.9 Place the bags in secured storage.

4.6.1.10 Disconnect power supply to the pump.

4.6.1.11 document the sampling evolution in the Narrative Logbook.

4.6.2 WHEN directed by the SE or OFTL,
THEN prepare bags containing process vapor for transport to the analytical laboratory.

4.6.2.1 RCT: Perform radiological surveys of fittings, outlet hose, and sample container(s).

4.6.2.2 Have the bags checked for free release by RadCon personnel.

(JSA)

4.6.2.3 IF the bags cannot be free released by RadCon personnel, THEN label and handle the bags per instructions from RadCon personnel.

4.6.2.4 Place the bags in a sturdy protective container (for example, a rigid plastic box).

4.6.2.5 Ensure the box's label describes the contents and lists at least two points-of-contact.

4.6.3 VVET TECHNICIAN OR ANALYST: Transport bags to the laboratory for analysis and, if appropriate, turn the bags over to the person who will perform the analysis.

4.7 V/L Separator Liquid Manual Pump Out

NOTE: *Smears/swabs taken in this section during performance of radiological surveys for alpha, beta/gamma, and tritium contamination will be counted in the laboratory following field activities.*

WARNING

Liquid from the V/L separator may contain radioactive and/or chemical contamination. Directions on the applicable RWP must be followed during completion of the V/L separator liquid manual pump out.

(JSA)

4.7.1 Wear nitrile gloves and safety glasses when coming in contact with liquid from the V/L separator.

(JSA)

4.7.2 Connect the outlet hose to the fittings on P-101 outlet valve HIV-115 and on the collection container.

NOTE: *Rags or other absorbent material may be used as necessary to clean water from surfaces. Any spent rags or absorbent material must be managed as consistent with Steps 4.7.14 and 4.7.15.*

4.7.3 Open valves HIV-102, HIV-113, and HIV-115.

CAUTION

If pump P-101 is run dry, rotating parts may be damaged.

4.7.4 Do not run pump if dry.

4.7.5 From the main menu, press and release PUMP P-101 button AND press and release the START button.

4.7.6 IF the V/L separator water level decreases below the lower view port OR approximately 5-gal of liquid are pumped into the collection container,
THEN place in the STOP position.

4.7.7 IF the V/L separator water level is below the lower view port,
THEN GO TO Step 4.7.11.

4.7.8 Connect the outlet hose to another collection container and place the lid on the filled container.

4.7.9 Repeat Steps 4.7.4 through 4.7.8 to empty the V/L separator.

4.7.10 Close valves HIV-102, HIV-113, and HIV-115.

4.7.11 Ensure the lid is placed on the container.

4.7.12 RCT: Perform radiological surveys of fittings, outlet hose, and sample container(s).

NOTE: *The container(s) of water from the V/L separator must be managed as Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) waste unless and until analysis of the water and guidance from Waste Generator Services (WGS) staff calls for management under a different protocol. After process knowledge through analysis of a sufficient number of samples is established, WGS may provide waste management guidance based on process knowledge.*

(JSA)

4.7.13 Label the container(s) with label(s) obtained from the OFTL.

NOTE: *The container(s) must be held in a heated Waste Area Group (WAG) 7 CERCLA waste storage area when freezing temperatures are expected.*

4.7.14 Place the labeled container(s) in a WAG 7 CERCLA waste storage area.

4.7.15 Request WGS staff sample, analyze, and dispose of the water.

4.8 Shutdown Alarms

WARNING

Exceeding limits of acceptable operation may result in potential personnel danger.

CAUTION

Exceeding limits of acceptable operation may result in potential equipment mechanical damage.

NOTE: *Shutdown alarms occur when limits of acceptable operation are exceeded during VVET unit operations. Shutdown alarms result in a shutdown of the unit. Depending on the nature of the alarm, the unit may or may not go through a post run purge.*

4.8.1 IF a shutdown alarm, as indicated by the OIT audible alarm, or by supervisory control and data acquisition (SCADA) indication, is activated,
THEN determine which alarm indicator is activated and resolve the cause of the alarm using information in Table 4 and, if necessary, the SE.

4.8.2 WHEN the cause of the shutdown is determined, understood, and corrected,
THEN GO TO Section 4.2 to initiate restart of the unit.

Table 4. Shutdown alarms.

Alarm OIT Indicator	Setpoint	System Response	Corrective Action
FAL-101 (From FE-101)	200 scfm	Low total flow. OIT will indicate if the process flow drops below 200 scfm for 30 seconds. The unit will enter time-delayed shutdown mode. The system has 30 seconds for the flow to increase to minimum flow rate setpoint. If minimum flow is not satisfied within this time, the system will shut down.	Ensure well isolation valve FCV-101 and selected well isolation valves HIV-140, 150, 160, and/or 170 are in the OPEN position in run mode.
FAH-101 (From FE-101)	600 scfm	High total flow. OIT will indicate if the process flow is above 600 scfm for 10 seconds. The unit will enter time-delayed shutdown mode.	
TAH-101	300°F	OIT will indicate if the extraction blower discharge temperature exceeds 300°F. The unit will enter time-delayed shutdown mode.	Ensure that the blower outlet is not at a high pressure (PI-102) and that process flow is at setpoint.
LAH-101	High-High trip alarm	OIT will indicate vapor liquid separator tank high level for 10 seconds.	Empty VLS tank,
OAH-602	VLS Tank pump motor overload	OIT will indicate vapor liquid separator pump motor overload.	Troubleshoot P-101 for overload condition.
TAH-140 TAH-150 TAH-160 TAH-170	200°F	High well head temperature. OIT will indicate if the well gas heater exit is above 200°F. The unit will enter time-delayed shutdown mode after 10 seconds.	Ensure proper function of well heaters. Ensure proper TE-140, TE-150, TE-160 and/or TE-170 control loop setpoint value.
TAH-141 TAH-151 TAH-161 TAH-171	125°F	High manifold temperature. OIT will indicate if the well gas manifold entry temperature is above 125°F. The unit will enter time-delayed shutdown mode after 10 seconds.	Ensure proper function of well heaters. Ensure proper TE-140, TE-150. TE-160 and/or TE-170 control loop setpoint value.
TAL-301 TAL-302	850°F	Low reaction temperature. OIT will indicate if the catalyst bed inlet or outlet temperature drops below 850°F for 10 seconds. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Ensure proper function of the preheater. Ensure proper TE-301 or TE-302 setpoint value.

Table 4. Shutdown alarms. (continued)

Alarm OIT Indicator	Setpoint	System Response	Corrective Action
TAH-301 TAH-302	1050°F	High reaction temperature. OIT will indicate if the catalyst bed inlet or outlet temperature rises above 1050°F. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Ensure proper function of the preheater. Ensure proper TE-301 or TE-302 setpoint value. Feed of organic materials at excessively high concentration may result in high reaction temperature. Test reactor inlet composition for organic content.
TAH-303	600°F	High exhaust temperature. OIT will indicate if the exhaust temperature rises above 600°F. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Verify proper function of TE-303 and proper reaction temperature.
TAL-303	350°F	Low exhaust temperature. OIT will indicate if the exhaust temperature falls below 350°F for 10 seconds. The unit will enter time-delayed shutdown mode. (Alarm active in run mode only.)	Verify proper function of TE-303 and proper reaction temperature.
PAH-101	54 IWC	Blower outlet high pressure. OIT will indicate if blower outlet pressure is above 54 IWC for 10 seconds.	Troubleshoot blower outlet pressure for possible obstruction.
PAH-102	195 IWC	High vapor liquid separator tank vacuum. OIT will indicate if VLS tank vacuum is above 195 IWC for 10 seconds.	Ensure hand isolation and flow control valves are open for respective wells.

4.9 Normal Shutdown

NOTE: *The control system is programmed to initiate the following actions:*

A. Ambient intake air valve FCV-107 opens as indicated on the OIT

B. Pre-heater HTR-201 de-energizes as indicated on the OIT

C. Ten seconds after receiving the shutdown signal, well isolation valve, FCV-101, closes as indicated on the OIT

D. Well heater HTR-140, HTR-150, HTR-160 and/or HTR-170 de-energizes as indicated on the OIT

E. Blower BLO-101 stops after a 2-minute purge as indicated by lack of sound of the blower operating.

4.9.1 Press and release the SHUTDOWN menu button on the OIT.

4.9.2 IF the system is to be promptly restarted,
THEN upon direction from the OFTL or SE,
GO TO Step 4.1.4 to initiate restart of the system.

4.9.3 IF the system is not to be promptly restarted,
THEN **GO TO** Section 4.11
AND complete post-shutdown activities.

4.10 Emergency Shutdown

NOTE: *The control system is programmed to affect the same actions as Step 4.9.1, except that blower BLO-101 stops immediately.*

4.10.1 Push the EMERGENCY SHUTDOWN button ES-802, located on panel CP-800, or ES-801 located outside near personnel door.

4.10.2 IF time and conditions permit (for example, if an immediate evacuation is not required),
THEN GO TO Section 4.11.

4.11 Post Shutdown Activities

4.11.1 Close well isolation flow control valves identified in Table 3 for respective unit.

4.11.2 Complete other post-shutdown activities requested by the OFTL or SE.

5. RECORDS

Record Description	Classification	Uniform File Code	Disposition Authority	Retention Period
TPR-1662 Case File	Permanent	0250	A16-1.1	Permanent. Cutoff when obsolete or superseded.
Pre-job and Post-job Reviews and Checklists	Maintain in accordance with MCP-3003			
VVET Log Sheets[a]	Nonpermanent Quality	7305	ENV1-e-6	Destroy when 75 years old.

a. VVET operations include the maintenance of a separate set of logs for each operating unit. Each set includes two log sheets to be completed daily, described as follows:

- Operating Log serves as a record for the operator's periodic observation and entry of instrument readouts and equipment operating parameters during their shift inspections.
- Narrative Sheet is used to generate a history of conditions, events, problems, and accomplishments for each unit.

6. REFERENCES

Companywide Manual 9, Operations

DOE/ID-10587, Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites

Electrical One-line Drawing (Unit E Dwg. 624325, 624332 Unit F. Dwg. 624333, 524340)

Final Remedial Design/Remedial Action Workplan, Organic Contamination in the Vadose Zone, Operable Unit 7-08 (by Scientech Inc., SCI-COM-200-95, Oct. 1995)

INEL/EXT-03-00467, Health and Safety Plan for the Vapor Vacuum Extraction with Treatment for the Organic Contamination in the Vadose Zone at the Radioactive Waste Management Complex, Operable Unit 7-08

INEL/EXT-99-00907, Field Sampling Plan for Operations and Monitoring Sampling Conducted in Support of the Organic Contamination in the Vadose Zone Remediation Project

LST-18, Conduct of Operations Conformance Matrices for the RWMC (DOE Order 5480.19)

MCP-3003, Performing Pre-job Briefings and Documenting Feedback

MCP-3562, Hazard Identification, Analysis, and Control of Operational Activities

Piping and Instrumentation Drawings (Unit E. Dwg. 624299, 624300, 624301, 626166, 626167. Unit F. Dwg. 624307, 624308, 624309, 624310, 625527, 625528.)

STD-101, Integrated Work Control Process

MCP-1194, Logbook practices for ER and Deactivation, Decontamination, and Decommissioning Projects.

7. APPENDIXES

Appendix A, Catalytic Oxidizer Operational Modes

Appendix B, Component Line Up

Appendix C, Procedure Basis

Appendix A

Catalytic Oxidizer Operational Modes

The four operational modes of the VVET catalytic unit are described below:

Mode	Description	Cause of Entry into Mode
Preheat	Ambient air is drawn into the blower, preheated, and passed through the reactor. The catalyst bed inlet and outlet are heated to a minimum of 850°F, and the exhaust is heated to 350°F.	Pushing the start button on the OIT.
Run	When system temperature is stabilized at the desired flow rate, processing of process vapor is initiated.	Completion of successful preheat cycle, at which time, the following conditions must exist: TE-301 ≥ 850°F TE-302 ≥ 850°F TE-303 ≥ 350°F TE-140, TE-150, TE-160 and/or TE-170 ≥ 55°F (This temperature must be achieved within 90 minutes for TE-140, 150, and 160 and 2 hours for TE-170 after HIV-101 is opened.) TE-141, TE-151, TE-161, and/or TE-171 ≥ 55°F (This temperature must be achieved within 90 minutes for TE-141, 151, and 161 and 2 hours for TE-171 after HIV-101 is opened.)
Time Delayed Shutdown	The system shuts down automatically. The blower remains on for 2 minutes after the system enters the time-delayed shutdown mode.	The system enters the time-delayed shutdown mode when: Any of the parameters identified in Table 4 are exceeded.
Instant Shutdown	The system shuts down automatically. The blower shuts down immediately upon the system entering the instant shutdown mode.	The system enters instant shutdown mode when the ES button is pushed in (ES-801 and ES-802) and the blower motor is overloaded.

Appendix B

Component Line Up

Part A: Manually Operated Valves

Valve Number	Related Component	Normal Pre-start Position	Comment
FCV-106	Ambient air inlet	0-30% Open	Technician judgment is used in positioning.
HIV-102	P-101 inlet	Closed	
HIV-113	P-101 outlet pressure gauge PI-103	Closed	
HIV-115	P-101 outlet	Closed	
HIV-140	Well isolation	Open	Open if respective well is in operation.
HIV-150	Well isolation	Open	Open if respective well is in operation.
HIV-160	Well isolation	Open	Open if respective wells are in operation.
HIV-170	Well isolation	Open	Open if respective well is in operation.
HIV-111	Process air sample	Closed	
HIV-195	Radiological continuous sampler subsystem inlet	Open	If valve is found unexpectedly closed, then the RCT foreman must be notified.
HIV-196	Radiological continuous sampler subsystem outlet	Open	If valve is found unexpectedly closed, then the RCT foreman must be notified.
HIV-105	PI-101 isolation	Open	
FCV-140A	Well flow air control	Open	Technician judgment is used in positioning.
FCV-140B	Well flow air control	Open	Technician judgment is used in positioning.
FCV-140C	Well flow air control	Open	Technician judgment is used in positioning.

Valve Number	Related Component	Normal Pre-start Position	Comment
FCV-150A	Well flow air control	Open	Technician judgment is used in positioning.
FCV-150B	Well flow air control	Open	Technician judgment is used in positioning.
FCV-150C (Unit F only)	Well flow air control	Open	Technician judgment is used in positioning.
FCV-160A	Well flow air control	Open	Technician judgment is used in positioning.
FCV-170A (Unit F only)	Well flow air control	Open	Technician judgment is used in positioning.
FCV-170B (Unit F only)	Well flow air control	Open	Technician judgment is used in positioning.
FCV-170C (Unit F only)	Well flow air control	Open	Technician judgment is used in positioning.

Part B-Unit E Electrical Component Lineup

CB-600 (MCC-600)	Main breaker, motor control center	ON	
CB-601 (MCC-600)	Breaker switch for BLO-101, extraction blower	ON	
CB-602 (MCC-600)	Breaker switch for P-101, vapor liquid separator pump	ON	Can be placed in off position when pump is not in use.
CB-603 (MCC-600)	Breaker switch for HTR-201, preheater	ON	
CB-603A (MCC-600 CB-603)	Breaker switch for HTR-201 Circuit #1, preheater	ON	
CB-603B (MCC-600 CB-603)	Breaker switch for HTR-201 Circuit #2, preheater	ON	
CB-605 (MCC-600)	Breaker switch for ACU-605, air conditioner	ON	
CB-606 (MCC-600)	Breaker switch for RCPT-606, weld receptacle	ON	Can be placed in off position when receptacle is not in use.
CB-607 (MCC-600)	Breaker switch for XFR-607, transformer feeds LP-700	ON	
CKT 1 (LP-700)	Breaker switch for LT-801, indoor lighting	ON	
CKT 2 (LP-700)	Breaker switch for LT-802, outdoor lighting	ON	
CKT 3 (LP-700)	Breaker switch for UT-801 & UT-802, GFCI outlets	ON	
CKT 4 (LP-700)	Breaker switch for CP-800, control power	ON	
CKT 5 (LP-700)	Breaker switch for LP-740, panel for well line 140	ON	
CKT 6 (LP-700)	Breaker switch for LP-750, panel for well line 150	ON	

CKT 7 (LP-700)	Spare	OFF	
CKT 8 (LP-700)	Breaker switch for RCPT-760	ON	
CKT 9 (LP-700)	Spare	OFF	
CKT 10 (LP-700)	Breaker switch for FCV-160A	ON	
CKT 11-15 (LP-700)	Spare	OFF	
CKT 16/18 (LP-700)	Main breaker	ON	
CB-640 (MCC-600)	Breaker switch for HTR-140, well line preheater	ON	
CKT 1 (LP-740)	Breaker switch for RCPT-740	ON	
CKT 2 (LP-740)	Breaker switch for FCV-140A	ON	
CKT 5 (LP-740)	Breaker switch for FCV-140B	ON	
CKT 6 (LP-740)	Breaker switch for FCV-140C	ON	
CKT 3, 4, 7, 8 (LP-740)	Spare	OFF	
CB-650 (MCC-600)	Breaker switch for HTR-150, well line preheater	ON	
CKT 1 (LP-750)	Breaker switch for RCPT-750	ON	
CKT 2 (LP-750)	Breaker switch for FCV-150A	ON	
CKT 5 (LP-750)	Breaker switch for FCV-150B	ON	
CKT 3, 4, 6, 7, 8 (LP-750)	Spare	OFF	
CB-660 (MCC-600)	Breaker switch for HTR-160, well line preheater	ON	
CB-670 (MCC-600)	Spare	OFF	
CB-680 (MCC-600)	Spare	OFF	
CB-690 (MCC-600)	Spare	OFF	

Appendix B

Part C – Unit F Electrical Component Lineup

Component Number	Component Name (and Component Supplied)	Normal Pre-start Position	Comment
CB-600 (MCC-600)	Main breaker, motor control center	ON	
CB-601 (MCC-600)	Breaker switch for BLO-101, extraction blower	ON	
CB-602 (MCC-600)	Breaker switch for P-101, vapor liquid separator pump	ON	Can be placed in off position when pump is not in use.
CB-603 (MCC-600)	Breaker switch for HTR-201, preheater	ON	
CB-603 A (MCC-600)	Breaker switch for HTR-201, Circuit #1 preheater		
CB-603 B (MCC-600)	Breaker switch for HTR-201, Circuit #2 preheater		
CB-605 (MCC-600)	Breaker switch for AC 605, air conditioner	ON	
CB-606 (MCC-600)	Breaker switch for RCPT-606, weld receptacle	ON	Can be placed in off position when receptacle is not in use.
CB-607 (MCC-600)	Breaker switch for XFMR-607, transformer feeds LP-700	ON	
CKT 1 (LP-700)	Breaker switch for LT-801, indoor lighting	ON	
CKT 2 (LP-700)	Breaker switch for LT-802, outdoor lighting	ON	
CKT 3 (LP-700)	Breaker switch for UT-801 & 802, GFCI outlets	ON	
CKT 4 (LP-700)	Breaker switch for	ON	

Component Number	Component Name (and Component Supplied)	Normal Pre-start Position	Comment
	CP-800, control power		
CKT 5 (LP-700)	Breaker switch for LP-740, panel for well line 140	ON	
CKT 6 (LP-700)	Breaker switch for LP-750, panel for well line 150	ON	
CKT 7 (LP-700)	Breaker switch for RCPT-760	ON	
CKT 8 (LP-700)	Breaker switch for LP-770, panel for well line 170	ON	
CKT 9 (LP-700)	Breaker switch for FCV-160A	ON	
CKT 10 – 15, 17 (LP-700)	Spare	OFF	
CKT 16/18 (LP-700)	Main breaker	ON	
CB-640 (MCC-600)	Breaker switch for HTR-140, well line preheater	ON	
CKT 1 (LP-740)	Breaker switch for RCPT-740	ON	
CKT 2 (LP-740)	Breaker switch for FCV-140A	ON	
CKT 5 (LP-740)	Breaker switch for FCV-140B	ON	
CKT 6 (LP-740)	Breaker switch for FCV-140C	ON	
CKT 3, 4, 7, 8, (LP-740)	Spare	OFF	
CB-650 (MCC-600)	Breaker switch for HTR-150, well line preheater	ON	

Appendix B

Component Number	Component Name (and Component Supplied)	Normal Pre-start Position	Comment
CKT 1 (LP-750)	Breaker switch for RCPT-750	ON	
CKT 2 (LP-750)	Breaker switch for FCV-150A	ON	
CKT 5 (LP-750)	Breaker switch for FCV-150B	ON	
CKT 3, 4, 6, 7, 8, (LP-750)	Spare	OFF	
CB-660 (MCC-600)	Breaker switch for HTR-160, well line preheater	ON	
CB-670 (MCC-600)	Breaker switch for HTR-170, well line preheater	ON	
CKT 1 (LP-770)	Breaker switch for RCPT-770	ON	
CKT 2 (LP-770)	Breaker switch for FCV-170A	ON	
CKT 5 (LP-770)	Breaker switch for FCV-170B	ON	
CKT 6 (LP-770)	Breaker switch for FCV-170C	ON	
CKT 3, 4, 7, 8, (LP-770)	Spare	OFF	
CB-672 (MCC-600)	Breaker switch for HTR-172, well line preheater	ON	
CB-690 (MCC-600)	Spare	OFF	

Appendix B

Appendix C

Procedure Basis

Step	Basis	Reference
General	Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, or drawings that include appropriate quantitative or qualitative acceptance criteria for determining that prescribed results have been satisfactorily attained.	PRD-5076 4.1.1.1
All	Work scope	King, Buck Technology HD CatOx™ Model HD-500 Operation and Maintenance Manual
2.3, 2.5, 2.6, 2.9-2.12, 3.2, 3.9, 4.1.3, 4.5.2, 4.5.8.2, Notes 2 and 3 preceding Step 4.6.1.1, 4.6.2.2, Warning and Note preceding Step 4.7.2, Note preceding Step 4.7.13	Implementation of JSA requirements	RWMC JSA-276 and 6572

STANDARD OPERATING PROCEDURE

Performance Testing of Organic Contamination in the Vadose Zone Vapor Vacuum Extraction with Treatment Systems

Facility/System: OU 7-08

REVIEWERS	Required (X)
RWMC Radiological Engineer	X
RWMC Rigging Engineer	
RWMC Industrial Safety Engineer	X
RWMC Quality Engineer	X
RWMC Industrial Hygienist	
RWMC Environmental Engineer	
RWMC Fire Protection Engineer	
RWMC Criticality Engineer	
RWMC System Engineer	X
RWMC Operations	X
Other	

CONTENTS

1. INTRODUCTION

1.1 Purpose

This procedure provides instructions for collection and analysis of volatile organic and inorganic samples from Operable Unit (OU) 7-08 Organic Contamination in the Vadose Zone (OCVZ) Vapor Vacuum Extraction with Treatment (VVET) catalytic oxidation systems. This procedure provides instructions for parking of the emission monitoring trailer, connection to electrical service, energizing of the trailer service connection and load center, startup of the various electrical systems within the trailer, connection of the trailer to sample collection ports, startup and operation of the Fourier Transform Infrared (FTIR) spectrometer, and shutdown / demobilization of the trailer.

This emission monitoring activity is conducted in support of the OU 7-08 OCVZ VVET operation. This activity provides a metric by which the performance of the catalytic oxidizer in destruction of volatile organic contaminants (VOCs) can be measured. VOC destruction will generate contaminant emission totals which may be included in National Emission Standard for Hazardous Air Pollutant (NESHAP) or other regulatory compliance reporting. Data generated through this activity will be input to the OCVZ VVET contaminant dispersion model to increase the accuracy of worker exposure estimates.

1.2 Scope and Applicability

This procedure directs the startup, operation, and shutdown of the OCVZ performance testing system.

This procedure applies to all personnel who operate the performance testing system. See Appendix A for Procedure Basis.

2. PRECAUTIONS AND LIMITATIONS

2.1 All personnel performing steps in this procedure must meet Radioactive Waste Management Complex (RWMC) access training requirements, be familiar with the design and operation of the performance monitoring system as documented by completing required reading of EDF-4351 and be cognizant of the potential hazards associated with its operation, plus be familiar with operation of the VVET Catalytic Oxidation System and cognizant of its associated potential hazards.

2.1.1 The only exceptions to this requirement are:

Personnel who are involved in on-shift training and are under the direct and immediate supervision of a qualified person.

B. Technical support staff who are escorted by a qualified person.

2.2 Entry into the VVET fenced area requires compliance with INEEL/EXT-03-00467, Health and Safety Plan (HASP). This includes use of personal protective equipment specified by postings on the fence surrounding the oxidizer unit.

2.3 VVET enclosure doors must be secured to prevent striking personnel during windy weather.

(JSA)

2.4 Repairs, troubleshooting, and corrective maintenance that require craft work must be done per Standard (STD)-101, Integrated Work Control Process. However, qualified persons are allowed to perform limited troubleshooting and adjustments/problem resolution following approval from the System Engineer (SE) or designated alternate and Shift Supervisor concurrence.

2.5 Prior to leaving the performance monitoring system operating but unmanned between noncontiguous shifts, the operator must ensure that the system is operating in a safe and stable manner.

2.6 Use mechanical lifting (i.e., forklift), as appropriate, or use two-person lifts. Limit manual lifting to 50 lb or 1/3 of body weight (whichever is less).

(JSA)

2.7 Identify pinch points and be aware of body position.

(JSA)

2.8 Use caution while working and walking in the field. Sand/salt ice-covered surfaces, identify tripping hazards (e.g., probes and uneven terrain), wear proper footwear.

(JSA)

2.9 Wear appropriate personal protective equipment (PPE) Level D, (safety glasses with side shields, safety-toed boots) inside the VVET fenced area. Leather gloves are also required during certain trailer mobilization activities and hard hats are required to be worn inside the Unit D enclosure.

(JSA)

2.10 Personnel must follow heat/cold stress requirements in MCP-2704.

(JSA)

2.11 Complete required radiological surveys during demobilization of the emission monitoring trailer.

(JSA)

2.12 Use ground fault circuit interrupter (GFCI) protection on all 120 V outdoor electrical equipment.

(JSA)

2.13 Use weather-tight or protected connections for 480 V service and only perform connection and disconnection of 480 V service in dry outside conditions.

(JSA)

2.14 Industrial Hygiene (IH) shall be contacted whenever rodent feces, urine or nesting materials are identified to avoid contamination. Potentially contaminated material will be cleaned up per MCP-2750, Preventing Hantavirus Infection.

(JSA)

2.15 Avoid contact with spiders and snakes. Take appropriate action if bitten.

(JSA)

2.16 Personnel who handle compressed gas bottles shall be trained on safe handling, storage, and use requirements. Compressed gas bottles will be handled, stored and used in a safe manner in accordance with PRD-5040.

3. PREREQUISITES

3.1 The performance monitoring system operator must have access to two-way wireless communication (radio or cellular telephone), capable of contact with the RWMC Shift Supervisor (SS), while performing the activities outlined in this procedure.

3.2 A pre-job briefing must have been performed in accordance with MCP-3003, Performing Pre-Job Briefings and Post-Job Reviews, that covers, but is not limited to, the following:

A. HASP

B. Potential hazards associated with OCVZ catalytic oxidizer performance testing (JSA-802).

3.3 The instrument does not need annual calibration. Part of the sequence of analyses includes analysis of standard gases at the beginning and end of the sequence that are used to make a calibration curve and as an instrument response check.

4. INSTRUCTIONS

4.1 General Instructions

NOTE 1: *This procedure covers the six operational modes of the performance monitoring system. The six modes are discussed in Appendix B.*

NOTE 2: *All actions will be performed by OCVZ engineering and technical support, unless indicated otherwise within the procedure.*

4.1.1 Operations Field Team Leader (OFTL): Ensure prerequisites are complete.

4.1.2 IF a step cannot be completed
AND operator is not directed otherwise by this procedure,
THEN exit the procedure
AND notify the OFTL or SE.

4.1.3 WHEN either of the following actions needs to occur,
THEN notify the RCT Foreman:

A. Sample lines are to be connected to the oxidizer.

B. Sample lines are to be disconnected from the oxidizer.

4.1.4 WHEN one of the following tasks is to be achieved, **GO TO** the appropriate procedure section.

Task to be Completed	Procedure Section
Perform pre-operational activities	**GO TO** Section 4.2
Perform mobilization activities	**GO TO** Section 4.3
Perform normal startup	**GO TO** Section 4.4
Perform and monitor normal operations	**GO TO** Section 4.5
Perform system restart	**GO TO** Section 4.6
Perform normal shutdown	**GO TO** Section 4.7
Perform demobilization activities	**GO TO** Section 4.8

4.2 Pre-Operational Activities

4.2.1 Walk down the areas outside and inside the enclosure and observe general conditions as well as the following specific items. If anything is found out of place, consult with the OFTL/SE before continuing.

A. Placement and condition of fencing and postings

B. Housekeeping

C. VVET system is operational

D. No lockout/tagouts on VVET system

E. Placement and condition of machine guarding

4.3 Mobilization

NOTE: *Preparation of the performance monitoring system for operation includes delivery of the trailer to the location to be monitored, disconnection of the trailer, connection to electrical service, and connection of sampling apparatus.*

4.3.1 Contact the VVET SE or OFTL to discuss performance monitoring system deployment.

4.3.1.1 Verify that monitoring activities will not impede planned maintenance, monitoring, operations, or other activities.

4.3.2 Transport the trailer to the site to be monitored.

NOTE: *Corner post jacks are intended for stabilization only. Corner post jacks should not be used to level the trailer.*

4.3.3 Level the trailer and chock the trailer wheels.

4.3.4 Disconnect the trailer from the tow vehicle.

4.3.5 Extend the corner post jacks to stabilize the trailer.

4.3.6 Verify that the electrical service disconnect for the trailer, located on the outer oxidizer enclosure wall, is in the "OFF" position.

4.3.6.1 IF the disconnect is in the "ON" position,
THEN switch the disconnect to "OFF."

4.3.7 Verify that electrical breakers in the trailer load center, FTIR-PP-DA01, are in the "OFF" position.

4.3.7.1 IF any breakers are in the "ON" position,
THEN switch those breakers to "OFF."

4.3.8 Verify that all equipment in the trailer is switched to the "OFF" position.

4.3.8.1 IF any equipment is in the "ON" position,
THEN switch that equipment to "OFF."

4.3.9 Inspect the Teflon sample lines for signs of damage.

4.3.9.1 IF damage is identified on any sample line,
THEN replace that sample line.

CAUTION

Heated Teflon sample lines can be damaged by excessive heat, direct sunlight, and mechanical stress and strain. Care must be taken while routing the sample lines from the trailer to the oxidizer to prevent thermal damage to the outer jacket or Teflon tube. The sample line must be supported off the ground to prevent damage from foot traffic and shaded from direct sunlight where practical.

4.3.10 Route the teflon sample lines and sample return line from the trailer to the appropriate oxidizer ports.

4.3.10.1 Use Unistrut or equivalent supports to shelter the sample lines and provide mechanical support.

4.3.10.2 Route the lines so that contact is minimal between the tubes.

4.3.10.3 Secure and support the sample lines off of the floor inside the oxidizer enclosure.

4.3.10.4 Route the sample lines to avoid contact with hot surfaces.

4.3.10.5 Obtain RadCon coverage for the connection of sample lines to the VVET process lines

4.3.10.6 Connect the sample lines to the inlet, exhaust, and sample return ports of the oxidizer.

4.3.11 Verify that the sample lines have been routed to minimize exposure to direct sunlight, and contact with the ground, and to avoid hot surfaces.

4.3.12 Prepare the trailer electrical service to be energized.

4.3.12.1 Connect the trailer shoreline to electrical service.

4.3.12.2 Energize the 480V electrical service disconnect, located on the outer oxidizer enclosure wall.

4.3.12.3 Energize the load center main breaker on FTIR-PP-DA01.

4.3.12.4 Energize the individual breakers in the trailer load center, FTIR-PP-DA01.

4.3.12.5 Adjust the trailer heater thermostat to approximately 70°F.

4.3.12.6 Adjust the trailer air conditioner thermostat to 75°F and switch to the "COOL" position.

CAUTION

Compressed gas cylinders must be stored upright, secured from movement, and protected from damage by the elements

4.3.13 Prepare standard gas cylinders for use.

4.3.13.1 Remove the cylinder protective covers.

4.3.13.2 Attach the appropriate pressure regulators to the standard gas cylinders.

4.3.13.3 Fully close the pressure regulator diaphragm valves.

4.3.13.4 Fully close the pressure regulator outlet shutoff valves.

4.3.13.5 Open the standard gas cylinder shutoff valves.

4.3.13.6 Adjust the standard gas cylinder pressure regulators to approximately 15 psig.

4.3.13.7 Fully open the pressure regulator outlet shutoff valves.

4.3.13.8 Complete a leak check of the standard gas transfer lines.

4.4 Normal Startup of the Performance Monitoring System

4.4.1 Ensure the standard gas pressure regulators are adjusted to an outlet pressure of approximately 15 psig.

4.4.2 Energize the gas purifier, FTIR-GGEN-DA01.

4.4.2.1 Adjust the outlet pressure regulator of the gas purifier to approximately 15 psig.

4.4.3 Energize the spectrometer, DC power supply, and control circuits.

4.4.4 Energize the Data Acquisition and Control (DAC) computer.

4.4.5 Energize the vacuum pump.

4.4.6 Start the DAC software.

4.4.7 Verify proper function of the DAC system.

4.4.8 Adjust flow rates as appropriate.

4.4.9 Initiate automated sampling and data acquisition.

4.4.10 Verify proper function of the sampling system as indicated by the DAC interface screen and cycling of system solenoid valves to effect sampling.

4.4.11 IF startup of automated sampling fails,
THEN RETURN TO Step 4.3, verify that subsequent steps were properly executed, and make corrections as required.

4.4.12 IF startup of automated sampling fails after two attempts,
THEN contact the SE/OFTL to initiate resolution of the cause of startup failure.

4.5 Normal Operations

NOTE: *Operation of the performance monitoring trailer is essentially autonomous unless power supply is interrupted. The system may operate for a week or more at a time without operator intervention.*

4.5.1 Verify normal operation of the sampling and analysis system.

4.5.1.1 Ensure the standard gas and purge gas generator regulator pressures are set at approximately 15 psig.

4.5.1.2 Ensure the DAC system is operating normally, and data is being stored.

4.5.1.3 Ensure the solenoid control valves are opening and closing when actuated as indicated by flow through the respective valve.

NOTE: *Standards and samples can be analyzed on-line from hard plumbed tubing or off-line from sample bags or containers that do not exceed 20 psig delivery pressure.*

4.5.1.4 IF analyzing from sample bags or containers,
THEN connect the container to the 3-way valve and draw a sample.

4.5.2 IF the system is operating normally,
THEN proceed to Step 4.5.3.

IF the system is NOT operating normally,
THEN proceed to Step 4.6.

4.5.3 Periodically download and archive sample data from the DAC computer.

4.5.3.1 Verify the integrity of the stored data.

A. Write data to CD or other portable data storage media.

B. Close the File

C. Open the File

D. Verify that the data is accessible and readable.

4.5.3.2 Delete sample data from the DAC computer hard drive.

4.6 Restart of the Performance Monitoring System

NOTE: *Restart of the performance monitoring system may be required if an interruption of electrical service to the trailer is encountered or a component in the monitoring system fails.*

4.6.1 Determine the cause of system shutdown.

4.6.1.1 Contact the SE or OFTL to identify interruptions to electrical service that may have occurred.

4.6.1.2 Examine system components and verify that they are in good repair and functioning properly.

4.6.1.2.1 IF a component has failed,
THEN remove the performance monitoring system from service,
AND initiate a repair.

4.6.2 Download and archive sample data from the DAC computer.

4.6.2.1 Verify the integrity of the stored data.

A. Write data to CD or other portable data storage media.

B. Close the File

C. Open the File

D. Verify that the data is accessible and readable.

4.6.2.2 Delete sample data from the DAC computer hard drive.

4.6.3 Perform applicable steps of section 4.4 and 4.5 to restart automated sampling and data acquisition.

4.7 Normal Shutdown of the Performance Monitoring System

4.7.1 WHEN the sampling and analysis are complete,
THEN suspend operation of the sampling and DAC systems.

4.7.2 Shut down the spectrometer, DC power supply, control circuits, and purge gas generator.

4.7.3 Download data from the DAC computer.

4.7.3.1 Verify the integrity of the stored data.

A. Write data to CD

B. Close the File

C. Open the File

D. Verify that the data is accessible and readable.

4.7.3.2 Delete sample data from the DAC computer hard drive.

4.7.4 Shut down the DAC computer.

4.8 Demobilization

4.8.1 IF the performance monitoring system is still operating,
GO TO Section 4.7;
THEN RETURN TO 4.8.2.

4.8.2 Secure all equipment in the trailer and prepare for transport.

4.8.3 Shut down the trailer heating and air conditioning systems.

4.8.4 Obtain RadCon support for surveys of sample line connections and Teflon filters

4.8.5 Disconnect and remove the Teflon sample lines from the oxidizer enclosure.

4.8.6 Disconnect the sample return line.

4.8.7 Replace the Teflon filters and request RadCon survey the filters.

4.8.8 Prepare standard gas cylinders for transport.

4.8.8.1 Close the standard gas cylinder bottle valves.

4.8.8.2 Bleed the remaining pressure from the pressure regulator and transfer line.

4.8.8.3 Disconnect and stow pressure regulators.

4.8.8.4 Install the protective cylinder caps.

4.8.8.5 Plug the standard gas transfer line inlets.

4.8.9 Prepare the trailer electrical system for transport.

4.8.9.1 Turn off the lights inside the trailer.

4.8.9.2 Switch the individual trailer load center breakers in FTIR-PP-DA01 to the "OFF" position.

4.8.9.3 Switch the trailer load center main breaker in FTIR-PP-DA01 to the "OFF" position.

4.8.9.4 Switch the trailer electrical service disconnect, located on the outer oxidizer enclosure wall, to the "OFF" position.

4.8.9.5 Disconnect and stow the trailer electrical shoreline.

4.8.10 Prepare the trailer for transport.

4.8.10.1 Raise the trailer corner post jacks.

4.8.10.2 Attach a tow vehicle, connect safety chains, plug in trailer lights and brakes.

4.8.10.3 Remove wheel chocks.

4.8.10.4 Transport trailer to next location, as applicable.

4.8.10.5 When removing the trailer from RWMC, request RadCon survey the trailer for release using Form 441.63, Special Survey Techniques, per MCP-425.

5. RECORDS

Record Description	Classification	Uniform File Code	Disposition Authority	Retention Period
TPR-6859 Case File	INEEL Nonpermanent Quality	0250	A16-1.1	Permanent. Cut off when superseded, obsolete, or cancelled.

6. REFERENCES

Companywide Manual 9, Operations

DOE/ID-10587, Quality Assurance Project Plan for Waste Area Groups 1, 2, 3, 4, 5, 6, 7, 10, and Inactive Sites

Final Remedial Design/Remedial Action Workplan, Organic Contamination in the Vadose Zone, Operable Unit 7-08

INEEL/EXT-03-00467, Health and Safety Plan for the Vapor Vacuum Extraction with Treatment for the Organic Contamination in the Vadose Zone at the Radioactive Waste Management Complex, Operable Unit 7-08

INEL/EXT-99-00907, Field Sampling Plan for Operations and Monitoring Sampling Conducted in Support of the Organic Contamination in the Vadose Zone Remediation Project

LST-18, Conduct of Operations Conformance Matrices for the RWMC (DOE Order 5480.19)

MCP-3003, Performing Pre-Job Briefings and Post-Job Reviews

MCP-3562, Hazard Identification, Analysis, and Control of Operational Activities

Piping and Instrumentation Drawings (DWG-515640, -515641, and -515642)

STD-101, Integrated Work Control Process

7. APPENDIXES

Appendix A, Procedure Basis

Appendix B, Performance Monitoring System Operating Modes

APPENDIX A

Procedure Basis

Step	Basis	Reference
General	Activities affecting quality shall be prescribed by and performed in accordance with documented instructions, procedures, or drawings that include appropriate quantitative or qualitative acceptance criteria for determining that prescribed results have been satisfactorily attained.	PRD-5076 4.1.1.1
All	Safe Work	RWMC JSA-802
All	...operations procedures are developed for anticipated operations, tests, and abnormal or emergency situations...	MCP-2985 4.1.1

APPENDIX B

Performance Monitoring System Operating Modes

The six operational modes of performance monitoring system are described below:

Mode	Description	Cause of Entry into Mode
Mobilization	The performance monitoring trailer is attached to a tow vehicle, all instrumentation and equipment is installed and operational. Site preparations have been complete and service connections are available.	Performance monitoring activities are planned to commence.
Normal Startup	Mobilization activities have been executed and the electrical circuits have been energized. Sampling and analysis equipment is not operating.	The sampling and analysis system has been prepared for startup.
Normal Operations	The sampling and analysis system has been started and continues to operate normally.	The sampling and analysis system is operating normally and continued monitoring is desired.
Restart	Sample collection and analysis system has stopped as a result of interruption of electrical service or failure of a system component.	The cause of sampling and analysis suspension must be identified and resolved such that performance monitoring activities can resume.
Normal Shutdown	The sampling and analysis campaign has been completed and the system is operating normally.	The sampling and analysis system is operation and shutdown of monitoring is desired.
Demobilization	The system has been shut down. The system is to be prepared for transport to another monitoring location.	The sampling and analysis system has been shut down and transport to another monitoring location is desired.

Organic Contamination in the Vadose Zone
Operable Unit 7-08
Vapor Vacuum Extraction with Treatment

Unit D Operations Logbook

Organic Contamination in the Vadose Zone (OCVZ)
Operable Unit 7-08
Vapor Vacuum Extraction with Treatment (VVET)
Unit D Operations Logbook

Date Start_____
Date End_____

WHEN COMPLETED, RETURN LOGBOOK TO
COREY HARRIS (6-2850) OR
EMMA MCINTOSH (6-4610) AT MS 3960

*****IF OWNERSHIP OF THIS LOGBOOK CHANGES, PLEASE IMMEDIATELY NOTIFY COREY HARRIS AT francl@inel.gov*****

Logbook No.:_____

Logbook Assigned To:_____

Site:_____

Organic Contamination in the Vadose Zone (OCVZ)
Operable Unit (OU) 7-08
Vapor Vacuum Extraction with Treatment (VVET)
Unit D Operations Logbook

Notes:

1) This is an operations logbook and is compliant with MCP-1194, Logbook Practices for ER and Deactivation, Decontamination, and Decommissioning Projects, and MCP-2980 Chapter XI - Logkeeping.

2) The normally scheduled shift hours are 07:00 to 17:30 on scheduled workdays. When work is performed outside of these times, that fact will be known by the date and time provided on individual pages.

Signature Log

Printed Name	Signature	Initial

VVET Unit D Narrative Log
OU 7-08 OCVZ

Date:_____

Activities:

Individual Reviewing Log _____ Date _____ Pages Reviewed_____

VVET Unit D Narrative Log (Continued)

Date:_____ Intentionally No Data Entered This Page_____

VVET Unit D Operating Log

Date:_____Intentionally No Data Entered This Page_____

Time/Mode		PDI-101	TI-101	PDI-150	FCV-106	PI-171	TE-101	TE-301	TE-302A	TE-303
		IWC	°F	IWC	% Open	IWC	°F	°F	°F	°F
		FT-101	PIT-101	PIT-102	FCV-107	FCV-112	TE-150A	TE-151	TE-170	TE-171
		SCFM	IWC	IWC	% Open	% Open	°F	°F	°F	°F
		TE-170A	TE-170B	TE-170C	FT-150	FT-170A	FT-170B	FT-170C	PIT-150	PIT-170A
		°F	°F	°F	SCFM	SCFM	SCFM	SCFM	IWC	IWC
		PIT-170B	PIT-170C	ZT-170A	ZT-170B	ZT-170C				
		IWC	IWC	% Open	% Open	% Open				
Time/Mode		PDI-101	TI-101	PDI-150	FCV-106	PI-171	TE-101	TE-301	TE-302A	TE-303
		IWC	°F	IWC	% Open	IWC	°F	°F	°F	°F
		FT-101	PIT-101	PIT-102	FCV-107	FCV-112	TE-150A	TE-151	TE-170	TE-171
		SCFM	IWC	IWC	% Open	% Open	°F	°F	°F	°F
		TE-170A	TE-170B	TE-170C	FT-150	FT-170A	FT-170B	FT-170C	PIT-150	PIT-170A
		°F	°F	°F	SCFM	SCFM	SCFM	SCFM	IWC	IWC
		PIT-170B	PIT-170C	ZT-170A	ZT-170B	ZT-170C				
		IWC	IWC	% Open	% Open	% Open				
Normal operating ranges after Unit has stabilized and readings have leveled out.	Mode	PDI-101	TI-101	PDI-150	FCV-106	PI-171	TE-101	TE-301	TE-302A	TE-303
		IWC	°F	IWC	% Open	IWC	°F	°F	°F	°F
	Run	2.5-6	150-215	0-4.0	0-40	0-70	140-190	940-960	930-960	470-510
		FT-101	PIT-101	PIT-102	FCV-107	FCV-112	TE-150A	TE-151	TE-170	TE-171
		SCFM	IWC	IWC	% Open	% Open	°F	°F	°F	°F
	Run	275-425	10-40	20-120	0-95	25-90	0-100	0-100	0-125	0-100
		TE-170A	TE-170B	TE-170C	FT-150	FT-170A	FT-170B	FT-170C	PIT-150	PIT-170A
		°F	°F	°F	SCFM	SCFM	SCFM	SCFM	IWC	IWC
	Run	-40-100	-40-100	-40-100	0->120	0->120	0->120	0->120	0-120	0-120
		PIT-170B	PIT-170C	ZT-170A	ZT-170B	ZT-170C				
		IWC	IWC	% Open	% Open	% Open				
	Run	0-120	0-120	0-100	0-100	0-100				

VVET Unit D Operating Log Date:_____ Intentionally No Data Entered This Page_____

SYSTEM	OPERATING RANGE	AS FOUND CONDITION	COMMENTS
VAPOR LIQUID SEPARATOR (VVED-VLS-101)			
Bottom view port	No Liquid		
Middle view port	No Liquid		
Top view port	No Liquid		
Fluid leaks	No Leaks		
BLOWER (VVED-BLO-101)			
Belt Tension (visual check only)	No excessive		
Unusual noise or vibration	None		
Oil leaks	No leaks		
CONTROL PANEL (VVED-PP-600)			
HS-802	Off		
HS-805	Off		
LMP-806	Nor flashing		
Bulb check	All bulbs illuminate		
PROCESS VAPOR/AMBIENT AIR RAD SAMPLE FLOW RATE (VVED-FI-101)			
VVED-FI-101	1.9 – 2.3		

	Sample Number	Initial
Daily Influent Sample Collected		

Organic Contamination in the Vadose Zone
Operable Unit 7-08
Vapor Vacuum Extraction with Treatment

Unit E Operations Logbook

Organic Contamination in the Vadose Zone (OCVZ)
Operable Unit 7-08
Vapor Vacuum Extraction with Treatment (VVET)
Unit E Operations Logbook

Date Start_____
Date End_____

WHEN COMPLETED, RETURN LOGBOOK TO
COREY HARRIS (6-2850) OR
EMMA MCINTOSH (6-4610) AT MS 3960

*****IF OWNERSHIP OF THIS LOGBOOK CHANGES, PLEASE IMMEDIATELY NOTIFY COREY HARRIS AT francl@inel.gov*****

Logbook No.:_____

Logbook Assigned To:_____

Site:_____

Organic Contamination in the Vadose Zone (OCVZ)
Operable Unit (OU) 7-08
Vapor Vacuum Extraction with Treatment (VVET)
Unit E Operations Logbook

Notes:

1) This is an operations logbook and is compliant with MCP-1194, Logbook Practices for ER and D&D&D Projects, and MCP-2980 Chapter XI - Logkeeping.

2) The normally scheduled shift hours are 07:00 to 17:30 on scheduled workdays. When work is performed outside of these times, that fact will be known by the date and time provided on individual pages.

Signature Log

Printed Name	Signature	Initial

VVET Unit E Narrative Log
OU 7-08 OCVZ

Date:_____

Activities:

Individual Reviewing Log _____Date _____Pages Reviewed_____

VVET Unit E Narrative Log (Continued)

Date:_____ Intentionally No Data Entered This Page_____

Time	UIT-101				PIT-102 IWC	FCV-106 % Open	FCV-107 % Open	TE-301 °F	TE-302A °F	TE-303 °F
	SCFM	°F	IWC	IWC (D)						
Normal run mode operating range.	250 - 550	<=300	<=60	<=15	<=180	<=100	<=100	850 - 1050	850 - 1050	350 - 600

SE-7, IE-7, DE-7					6E, DE-1				8901D		
Instrument		140A	140B	140C			150A	150B			160A
In Use		YES ☐ NO ☐	YES ☐ NO ☐	YES ☐ NO ☐			YES ☐ NO ☐	YES ☐ NO ☐			YES ☐ NO ☐
UIT-140	SCFM				UIT-150	SCFM			UIT-160	SCFM	
	°F					°F				°F	
	IWC					IWC				IWC	
	IWC (D)					IWC (D)				IWC (D)	
FCV-140					FCV-150				FCV-160		
ZT-140					ZT-150				ZT-160		
TE-140					TE-150				TE-160		
TE-141					TE-151				TE-161		

Normal run mode operating range.	UIT-140, 150, 160, and 170	UIT-140, 150, 160, and 170	UIT-140, 150, 160, and 170	UIT-140, 150, 160, and 170	FCV-140, 150, 160, and 170	ZT-140, 150, 160, and 170	TE-140, 150, 160, and 170	TE-141,-151, 161, and 171
	SCFM	°F	IWC	IWC (D)	% Open	% Open	°F	°F
	<=550	<=150	<=180	<=15	<=100	<=100	<=150	<=125

SYSTEM	OPERATING RANGE	AS FOUND CONDITION	COMMENTS
VAPOR LIQUID SEPARATOR (VVEE-VLS-101)			
Bottom view port	No Liquid		
Middle view port	No Liquid		
Top view port	No Liquid		
Fluid leaks	No Leaks		
BLOWER (VVEE-BLO-101)			
Belt Tension (visual check only)	No excessive play		
Unusual noise or vibration	None		
Oil leaks	No leaks		
Oil level	Visible in sight glass		
PROCESS VAPOR/AMBIENT AIR RAD SAMPLE FLOW RATE (VVEE-FI-101)			
VVEF-FI-101	2.0 – 3.0 scfh		

	Sample Number	Initial
Daily Influent Sample Collected		

Organic Contamination in the Vadose Zone
Operable Unit 7-08
Vapor Vacuum Extraction with Treatment

Unit F Operations Logbook

Organic Contamination in the Vadose Zone (OCVZ)
Operable Unit 7-08
Vapor Vacuum Extraction with Treatment (VVET)
Unit F Operations Logbook

Date Start_____
Date End_____

WHEN COMPLETED, RETURN LOGBOOK TO
COREY HARRIS (6-2850) OR
EMMA MCINTOSH (6-4610) AT MS 3960

*****IF OWNERSHIP OF THIS LOGBOOK CHANGES, PLEASE IMMEDIATELY NOTIFY COREY HARRIS AT francl@inel.gov*****

Logbook No.:_____

Logbook Assigned To:_____

Site:_____

Organic Contamination in the Vadose Zone (OCVZ)
Operable Unit (OU) 7-08
Vapor Vacuum Extraction with Treatment (VVET)
Unit F Operations Logbook

Notes:

1) This is an operations logbook and is compliant with MCP-1194, Logbook Practices for ER and D&D&D Projects, and MCP-2980 Chapter XI - Logkeeping.

2) The normally scheduled shift hours are 07:00 to 17:30 on scheduled workdays. When work is performed outside of these times, that fact will be known by the date and time provided on individual pages.

Signature Log

Printed Name	Signature	Initial

VVET Unit F Narrative Log
OU 7-08 OCVZ

Date:_____

Activities:

Individual Reviewing Log _____Date _____Pages Reviewed_____

VVET Unit F Narrative Log (Continued)

Date:_____ Intentionally No Data Entered This Page_____

Time	UIT-101				PIT-102 IWC	FCV-106 % Open	FCV-107 % Open	TE-301 °F	TE-302A °F	TE-303 °F
	SCFM	°F	IWC	IWC (D)						
Normal run mode operating range.	250 - 550	<=300	<=60	<=15	<=180	<=100	<=100	850 - 1050	850 - 1050	350 - 600

SE-3, IE-3, DE-3					SE-8, IE-8, DE-8					2E			7E, IE-4, DE-4			
Instrument		140A	140B	140C			150A	150B	150C		160A			170A	170B	170C
In Use		YES ☐ NO ☐	YES ☐ NO ☐	YES ☐ NO ☐			YES ☐ NO ☐	YES ☐ NO ☐	YES ☐ NO ☐		YES ☐ NO ☐			YES ☐ NO ☐	YES ☐ NO ☐	YES ☐ NO ☐
UIT-140	SCFM				UIT-150	SCFM				UIT-160	SCFM		UIT-170	SCFM			
	°F					°F					°F			°F			
	IWC					IWC					IWC			IWC			
	IWC (D)					IWC (D)					IWC (D)			IWC (D)			
FCV-140					FCV-150					FCV-160			FCV-170				
ZT-140					ZT-150					ZT-160			ZT-170				
TE-140					TE-150					TE-160			TE-170				
TE-141					TE-151					TE-161			TE-171				

Normal run mode operating range.	UIT-140, 150, 160, and 170	UIT-140, 150, 160, and 170	UIT-140, 150, 160, and 170	UIT-140, 150, 160, and 170	FCV-140, 150, 160, and 170	ZT-140, 150, 160, and 170	TE-140, 150, 160, and 170	TE-141,-151, 161, and 171
	SCFM	°F	IWC	IWC (D)	% Open	% Open	°F	°F
	<=550	<=150	<=180	<=15	<=100	<=100	<=150	<=125

SYSTEM	OPERATING RANGE	AS FOUND CONDITION	COMMENTS
VAPOR LIQUID SEPARATOR (VVEF-VLS-101)			
Bottom view port	No Liquid		
Middle view port	No Liquid		
Top view port	No Liquid		
Fluid leaks	No Leaks		
BLOWER (VVEF-BLO-101)			
Belt Tension (visual check only)	No excessive play		
Unusual noise or vibration	None		
Oil leaks	No leaks		
Oil level	Visible in sight glass		
PROCESS VAPOR/AMBIENT AIR RAD SAMPLE FLOW RATE (VVEF-FI-101)			
VVEF-FI-101	2.0 – 3.0 scfh		

	Sample Number	Initial
Daily Influent Sample Collected		

Appendix C

Correspondence

Appendix C

Correspondence

This appendix contains a copy of an e-mail from Lisa Harvego that documents concurrence of the Idaho National Engineering and Environmental Laboratory calibration laboratory with the organic contamination in the vadose zone calibration approach.

Lisa A Harvego
03/18/2004 10:51 AM

To: David J Dickson/DAVEDJ/NON/INEEL/US@INEL
cc:
Fax to:
Subject: Re: Calibration Approach

----- Forwarded by Lisa A Harvego/LAP/CC01/INEEL/US on 03/18/2004 10:51 AM -----

Ryan D Mcmurtrey
02/02/2004 01:13 PM

To: Lisa A Harvego/LAP/CC01/INEEL/US@INEL
cc:
Fax to:
Subject: Re: Calibration Approach

----- Forwarded by Ryan D Mcmurtrey/MCMURD/CC01/INEEL/US on 02/02/2004 01:13 PM -----

Robert D Carmichael
10/21/2003 08:23 AM

To: Ryan D Mcmurtrey/MCMURD/CC01/INEEL/US@INEL
cc: Lisa A Harvego/LAP/CC01/INEEL/US@INEL
Fax to:
Subject: Re: Calibration Approach

I concur with the approach being taken. The "performance check" is a calibration. You will need to work out the uncertainty of the flow-meter due to calibrating it with a +/- 20% instrument, just in case someone asks. THANKS!
Ryan D Mcmurtrey

Ryan D Mcmurtrey
10/20/03 04:58 PM

To: Robert D Carmichael/BCQ/CC01/INEEL/US@INEL
cc: Lisa A Harvego/LAP/CC01/INEEL/US@INEL
Fax to:
Subject: Calibration Approach

I am writing to confirm your concurrence with the following approach to field instrumentation calibration.

This approach will be applied to all instruments currently installed at OCVZ Unit D on the RWMC/SDA and the associated pipeline instrumentation. In addition, this approach will include Unit E, Unit F, and their associated pipelines as they are brought on-line. The goal of this calibration approach is to complete a performance check of field instrumentation in place to minimize equipment and process downtime.

Unit D, E, and F each use a single flowmeter to measure and control total process flow. This total flow is subsequently used in estimation and reporting of cumulative flow. No accuracy requirements for this calculation have been imposed by the customer.

To meet INEEL calibration requirements, the project proposes the use of a calibrated handheld hot wire anemometer to measure flow velocity in each of the three systems. The flow rate measured with the calibrated anemometer will be compared to that of the primary process flowmeter in that system as a performance check. If the process flowmeter is determined to be functioning within accuracy requirements, the performing instrument technician will apply the appropriate calibration label to the flowmeter. If the instrument is determined to be operating outside of accuracy requirements, the flowmeter will be removed from service and repaired or replaced. The anemometer will be calibrated by the INEEL cal lab and used as a standard in the field by an instrument technician. As no accuracy requirements have been imposed by our customer, the accuracy requirements for flow measurement will default to the accuracy limits of the anemometer (~ +/- 20% of reading).

Data from secondary flowmeters at the extraction wellheads is not reported or used in subsequent calculations. Wellhead flowmeters are used as indicators and measurement accuracy is of a low priority. Calibration of wellhead flowmeters will not be completed.

Thermocouples and resistance temperature detectors (RTDs) are used primarily as temperature indicators in the process and measurement accuracy is not critical. Normal drift of temperature readings will not adversely impact process operation. The thermocouple and RTD outputs will be tracked and replaced if failure occurs. Calibration of process thermocouples/RTDs will not be completed.

Direct reading pressure gauges are used primarily as pressure indicators in the process and measurement accuracy is not critical. Pressure gauge readings are not used in process control or subsequent calculations and are not reported. Normal drift of pressure readings will not adversely impact process operation. The pressure gauge readings will be tracked and gauges will be repaired or replaced if failure occurs. Calibration of process pressure gauges will not be completed.

Please respond with your concurrence to this approach. With your concurrence I will begin development of a comprehensive list of process equipment and associated calibration requirements using the approved approach.

Appendix D

Technician Training Plan and Qualification Checklist

Appendix D

Technician Training Plan and Qualification Checklist

This appendix contains a copy of the Operable Unit 7-08 Vapor Vacuum Extraction with Treatment Units D, E, and F technician initial qualification checklist, which is used to technician document training achievements.

RWMC TRAINING QUALIFICATION CARD	
Name:	S#

OPERABLE UNIT 7-08 VAPOR VACUUM EXTRACTION WITH TREATMENT
CATALYTIC UNIT D, E, AND F TECHNICIAN TRAINING

RWMC TRAINING PROGRAM

VAPOR VACUUM EXTRACTION WITH TREATMENT
UNIT D, E, AND F TECHNICIAN
INITIAL QUALIFICATION CHECKLIST

Rev. 0
September 9, 2003

Checklist Number: QL323388

IT/Program Lead Review: Date:	SME/Technical Review: Date:
Training Manager/Supervisor Review: Date:	Line Manager/Supervisor Approval: Date:

MODIFICATION RECORD

Submitted by:_____ Date:_____

Change Number	Affected Pages	Description of Change	Management Approval

Signature Roster

If signing or initialing items within this qualification checklist, enter your name on the roster below. Please print your name legibly in the first column, sign in the second, and place your initials in the last column.

Name (Print)	Signature	Initials

I. INTRODUCTION

A. This checklist is to be completed by:

1. Each Vapor Vacuum Extraction with Treatment (VVET) technician assigned to work on catalytic VVET Units D, E and F.

B. The purpose of this checklist is to identify training elements for which technicians must become qualified to work independently on VVET Units D, E, and F related equipment and to provide assurance that only qualified personnel are assigned to work independently on VVET Units D, E, and F related equipment.

C. Satisfactory knowledge of the training elements in this checklist is determined either through oral checkouts or completion of practical factors.

1. Practical factors are completed under the direct supervision of a qualified individual, *unless specifically stated otherwise.* Practical factors provide both hands-on experience and evaluation for the qualifying individual. Practical factors are required when the task is followed by a **P/S.** "**P**" for perform or "**S**" for simulate.

a. "**P**" requires the individual to actually perform the operation. Prior to performance, a thorough discussion of the operation must be completed between the individual and the reviewer. Abnormal situations that may arise during the operation will be discussed. Every effort shall be made to perform practical factors. If however, operational status, safety, or equipment availability precludes timely performance of the training element a simulation may be performed.

b. "**S**" requires the individual to simulate the performance during a walk-through of the operation in the same detail as a "**P**" except the actual operation is not performed. The same evolution discussion required for a "**P**" will be conducted. All items shall actually be performed, if plant conditions permit, at the discretion of the reviewing individual. When the task if followed by a **P/S,** the applicable letter must be circled.

c. An oral review and/or walk-through at the discretion of the reviewing individual may check out items not marked with a **P/S**.

D. Each sign-off represents verification that the qualifying individual has demonstrated a satisfactory level of knowledge and/or performance for the training element. Once a training element is signed off as complete, the technician is qualified to work independently on the task(s) signed off on the checklist. Each individual signature will be in permanent black ink and consist of a legal signature and full date. As a minimum, a legal signature consists of one initial and full last name. The date will indicate month, day, and year.

E. All applicable items are to be completed. Items that are not applicable must be marked N/A. All items marked N/A require a justification to delete the item and must be approved by Operable Unit (OU) 7-08 project management and/or supervisor. The justification is documented in the space provided at the end of the checklist and provides a legal signature and date.

F. Upon completion of this checklist it shall be routed for final review and approval. The checklist will then be routed to the training department for inclusion in the individual's training record.

G. By my signature below, I acknowledge that I have reviewed and understand the preceding checklist information. Additionally, I have verified that all pages of this checklist are present.

Qualifying Individual Signature _____ Date _____

II. SAFETY

A. Demonstrate, by oral checkout, a satisfactory understanding of the following safety items listed below. A satisfactory understanding is the ability to describe:
- Your responsibility concerning each safety item
- The purpose of each
- How to apply the safety program/practice

B. Checkout shall be by a qualified VVET Operations Field Technician Lead (OFTL) or a designated manager or supervisor.

1. Electrical Safety Practices (MCP 2731) Signature _____ Date _____

C. Complete the following training. This training is provided by the Site Training Directorate or an outside vendor and must be scheduled, as appropriate. Satisfactory completion of training is recorded in the TRAIN system, when appropriate. Training is verified by the OFTL or designated manager or supervisor and signature is provided in the appropriate sign-off block.

1. Lockout/Tagout for Authorized Employees (Limited) (000TRN663) or equivalent

   Signature _____ Date_____

2. Lockout/Tagout Practical (000TRN726) or equivalent

   Signature _____ Date_____

3. OU 7-08 HASP Training Requirements

   Signature _____ Date_____

4. Conduct of Operations Training Requirements

   a. Con Ops Chapter 1 Ops Organization (00TRN491) or equivalent

   Signature _____ Date_____

   b. Con Ops Chapter 2 Shift Routines (00TRN492) or equivalent

   Signature _____ Date_____

   c. Con Ops Chapter 3 Control Area Activities (00TRN493) or equivalent

   Signature _____ Date_____

   d. Con Ops Chapter 4 Ops Communication (00TRN494) or equivalent

   Signature _____ Date_____

   e. Con Ops Chapter 5 Control On-Shift Training (00TRN495) or equivalent

   Signature _____ Date_____

   f. Con Ops Chapter 6 & 7 Event Investigations (00TRN496) or equivalent

   Signature _____ Date_____

   g. Con Ops Chapter 8 Control of Equipment (00TRN497) or equivalent

   Signature _____ Date_____

   h. Con Ops Chapter 10 Independent Verification (00TRN499) or equivalent

   Signature _____ Date_____

   i. Con Ops Chapter 11 Log-keeping (00TRN500) or equivalent

   Signature _____ Date_____

j. Con Ops Chapter 12 Operations Turnover (00TRN575) or equivalent

Signature _____ Date_____

k. Con Ops Chapter 13 Operations Aspects (00TRN576) or equivalent

Signature _____ Date_____

l. Con Ops Chapter 14 Required Reading (00TRN577) or equivalent

Signature _____ Date_____

m. Con Ops Chapter 15 Timely Orders (00TRN578) or equivalent

Signature _____ Date_____

n. Con Ops Chapter 16 Operations Procedures (00TRN579) or equivalent

Signature _____ Date_____

o. Con Ops Chapter 17 Operator Aids (00TRN580) or equivalent

Signature _____ Date_____

p. Con Ops Chapter 18 Equipment Labeling (00TRN581) or equivalent

Signature _____ Date_____

III. VVET UNITS D,E, AND F ACADEMIC TRAINING

A. **Work with authorized personnel.** Informal training shall be completed on the theory and functionality of the catalytic oxidizer system. Through this training, the individual should be able to demonstrate satisfactory knowledge to:

- State the purpose of the systems.
- Identify the major components of the systems.
- Describe the function of each major component.
- Describe how components affect overall system operations.
- Describe the steps taken to ensure each component is functioning properly.
- Identify any special precautions, limitations or technical specifications to be considered prior to starting up, operating, and shutdown on the system.

B. Satisfactory completion of informal academic training is indicated by a qualified OFTL or VVET System Engineer or Project Engineer signature in the appropriate sign-off block.

1. VVET Unit D Informal Academic Training

Signature _____ Date _____

2. VVET Units E and F Informal Academic Training

Signature _____ Date _____

IV. ADMINISTRATIVE KNOWLEDGE

A. Demonstrate, by oral checkout, a satisfactory knowledge of TPR-1662 "VVET Catalytic Oxidizer Startup, Operation, and Shutdown", TPR-1634 "VVET Units E and F Catalytic Oxidizer Startup, Operation, and Shutdown", Round Sheet 041 "Daily VVET Unit Mechanical Inspection", and operations logbooks.

- State the purpose of the documents. (i.e. procedure, round sheet, logbooks)
- Describe the document applicability to job responsibilities.
- Describe administrative controls (Precautions and Limitations, Prerequisites).
- Identify document location and describe how documents are checked out and checked in.
- Identify minimum supporting personnel, when they should be contacted, and how they should be contacted.
- Describe the procedure as it applies to routine sampling activities.
- Demonstrate ability to obtain and record routine sample activity.
- Describe the procedure as it applies to routine daily operational readings and log book entries.
- Demonstrate ability to record routine daily operational readings and log book entries
- Describe the procedure as it applies to equipment monitoring and round sheet entries.
- Demonstrate ability to identify equipment, monitor operation, and record round sheet entries.

B. Satisfactory completion of administrative knowledge is indicated by a qualified OFTL signature in the appropriate sign-off block.

1. TPR-1662 "VVET Catalytic Oxidizer Startup, Operation, and Shutdown".

   Signature _____ Date_____

2. TPR-1634 "VVET Units E and F Catalytic Oxidizer Startup, Operation, and Shutdown".

   Signature _____ Date_____

3. Round Sheet 041 "Daily VVET Unit Mechanical Inspection".

   Signature _____ Date_____

4. VVET Operations Logbook.

   Signature _____ Date_____

V. DEMONSTRATE ROUTINE MONITORING AND SAMPLING ACTIVITIES

A. Demonstrate competency in each of the practical factors listed below. Satisfactory completion of practical factors is indicated by a qualified OFTL signature in the appropriate sign-off block.

1. Actively participate in TPR-1662 "VVET Catalytic Oxidizer Startup, Operation, and Shutdown".

   Signature _____ Date _____

2. Actively participate in TPR-1634 "VVET Units E and F Catalytic Oxidizer Startup, Operation, and Shutdown".

   Signature _____ Date _____

3. Actively participate in performance and completion of Round Sheet 041, "Daily VVET Unit Mechanical Inspection".

   Signature _____ Date _____

4. Actively participate in performance and completion of Operations Logbook entries.

   Signature _____ Date _____

NOTE: After completion of all steps in this Qualification Checklist (QL323388) through Section V the VVET Technician in training will be qualified to perform daily operational readings and logbook entries, monitor and record equipment operation and round sheet entries, and perform and record routine sample activities.

VI. DEMONSTRATE STARTUP, OPERATION, AND SHUTDOWN OF CATALYTIC OXIDIZERS

A. Demonstrate competency in each of the practical factors listed below. An oral review and/or walk-through at the discretion of the reviewing individual may check out the following items. Checkout of practical factors shall be by a qualified OFTL.

1. Perform Start-Up and Shut-Down of VVET Unit D

Signature _____ Date _____

2. Perform Start-Up and Shut-Down of VVET Unit E

Signature _____ Date _____

3. Perform Start-Up and Shut-Down of VVET Unit F

Signature _____ Date _____

B. **Items in this section are on the job (OJT).** They require the individual to demonstrate the ability to satisfactorily perform or simulate the following practical factors under the instruction of an authorized or qualified VVET Technician, or a qualified job supervisor using the applicable procedures. Checkout of OJT shall be by a qualified OFTL.

1. Perform at least 1 without error VVET Unit D Start-Up

Signature _____ P or S Date _____

2. Perform at least 1 without error VVET Unit D Shut-down

Signature _____ P or S Date _____

3. Perform at least 1 without error VVET Unit E Start-Up

Signature _____ P or S Date _____

4. Perform at least 1 without error VVET Unit E Shut-down

Signature _____ P or S Date _____

5. Perform at least 1 without error VVET Unit F Start-Up

Signature _____ P or S Date _____

6. Perform at least 1 without error VVET Unit F Shut-down

Signature _____ P or S Date _____

VI. EMERGENCY/ABNORMAL KNOWLEDGE

A. Demonstrate a satisfactory knowledge of the emergency/abnormal situations listed below during an oral checkout or walkthrough. A satisfactory knowledge should include the following, as appropriate. Checkout of emergency/abnormal knowledge shall be by a qualified OFTL.

- Describe reasons for action(s) taken and the effect on the VVET operation. Include the consequences of failure to perform the procedure or mitigate the abnormal or emergency situation.
- State the immediate actions.
- Describe notification requirements for each situation.

1. Simulate the response(s) to a loss of power to VVET Unit D

Signature _____ Date _____

2. Simulate the response(s) to a VVET Unit D that will not start up

Signature _____ Date _____

3. Simulate the response(s) to a loss of power to VVET Unit E

Signature _____ Date _____

4. Simulate the response(s) to a VVET Unit E that will not start up

Signature _____ Date _____

5. Simulate the response(s) to a loss of power to VVET Unit F

Signature _____ Date _____

6. Simulate the response(s) to a VVET Unit F that will not start up

Signature _____ Date _____

VII. JUSTIFICATION FOR DELETED OR N/A ITEMS

This section is provided to document the reason for each **N/A**. Each **N/A** will require a signature and date from OU 7-08 project management and/or supervisor. When completing this portion indicate the section or subsection that is **N/A** along with the reason for the **N/A**.

A. _____

_____

Signature _____ Date _____

B. _____

_____

Signature _____ Date _____

C. _____

_____

Signature _____ Date _____

D. _____

_____

Signature _____ Date _____

E. _____

_____

Signature _____ Date _____

VIII. EVALUATION

Satisfactory completion of written examinations on the theory and functionality of VVET Units D, E and F with a score of 80% or better. The exam proctor's signature indicates satisfactory completion of the examination.

1. VVET Unit D Written Examination

Signature _____ Date _____

2. VVET Units E and F Written Examination

Signature _____ Date _____

IX. QUALIFICATION APPROVAL

I have reviewed this checklist and determined that each item has been either signed, indicating it has been completed, or deemed N/A with my approval. The completion and approval of this checklist qualifies the individual to work independently on the VVET Units D, E and F.

Signature _____ Date _____
OU 7-08 Manager or Supervisor

X. CHECKLIST REVIEW

A review of the checklist has been completed and it has been determined that all required signatures are present and the checklist is acceptable for inclusion in the individual's training record.

Signature _____ Date _____
Training Representative